



Deep Vein Thrombosis with Iliac Vein Compression Syndrome in Early Pregnancy: A Case Report

Peng Zhao¹, Li Lin², Huan Zhang¹, Zhenzhong Zhang¹ and Xuan Li^{1*}

¹Department of Interventional Vascular Surgery, Peking University International Hospital, China

²Department of Gynaecology and Obstetrics, Peking University International Hospital, China

Abstract

Deep Vein Thrombosis (DVT) is a disease caused by abnormal blood coagulation in the deep veins of the lower limbs. Hypercoagulability and venous stasis during the perinatal period increase the risk of thrombosis. Iliac Vein Compression Syndrome (IVCS) is caused by compression of the left common iliac vein by the right common iliac artery and lumbar vertebra, leading to left common iliac vein stenosis, fiber adhesion and ultimately iliac vein thrombosis. IVCS is the main cause of acute iliac-femoral vein thrombosis. Herein, we report a case of a 38-year-old woman who was pregnant for 5 weeks and 5 days. She suddenly experienced swelling and pain in her left lower limb and was initially diagnosed with DVT and then IVCS upon further examination.

Keywords: Early pregnancy; Perinatal period; Gestation; Deep vein thrombosis; Iliac vein compression syndrome; Abortion

Introduction

Deep Vein Thrombosis (DVT) is a disease caused by abnormal blood coagulation in deep veins. Affected individuals can present lower limb swelling, pain and dysfunction due to obstructed blood flow. Thrombus detachment can cause a Pulmonary Embolism (PE), leading to gas exchange disorder, pulmonary hypertension, right ventricular dysfunction, and even dyspnea, shock and death in severe cases. DVT and PE are collectively called Venous Thromboembolism (VTE). A series of changes during the perinatal period, such as hypercoagulability, uterine enlargement that compresses the inferior *vena cava* and pelvic vein, and venous stasis, increase the risk of thrombosis.

IVCS, also known as Cockett syndrome or May-Thurner syndrome, is caused by the compression of the left common iliac vein by the right common iliac artery anterior to it and the lumbar vertebra posterior to it, leading to left common iliac vein stenosis, fibrous adhesions after repeated intimal injuries, and finally iliac vein thrombosis. IVCS is one of the reasons why DVT is more common in the left lower limb [1]. Some patients may have right iliac vein compression, and a small number of patients may have bilateral iliac or inferior vena cava involvement.

Although the relationship between gestation and DVT is known, there are few cases of iliac-femoral vein thrombosis during early pregnancy and the perinatal period.

Case Presentation

Medical history

A 38-year-old woman had 28-day menstrual cycles, 5 days of menses and 40 days of menopause. Color Doppler ultrasound revealed a fetal sac (1.7 cm × 1.7 cm × 0.8 cm) and a visible yolk sac in the uterus. The patient had a history of cesarean section 12 years ago and was usually anemic without other chronic diseases. The diagnosis was early pregnancy (5 weeks and 5 days of gestation). The pregnancy was unplanned, and the patient requested an abortion. Preoperative examinations showed a D-dimer concentration of 832 ng/ml (normal reference range: ≤ 250 ng/ml) and no other abnormalities. An abortion was scheduled for 1 week later. At 6 weeks and 3 days of gestation, she experienced swelling in her left lower limb in the morning, which became painful after getting out of bed. Therefore, she visited our hospital for emergency treatment. The physical examination revealed obvious swelling in her left lower limb, with red skin, high skin temperature, excessive skin tension, and Homans' sign (+); the circumference of the left calf was 4 cm larger than that of the right calf, and the circumference of the left thigh was 10 cm larger than that of the right thigh (Figure 1). The patient was preliminarily diagnosed with DVT of the left lower limb, and the possibility of IVCS could not be excluded. The patient's D-dimer concentration was 2495 ng/ml. Color Doppler

OPEN ACCESS

*Correspondence:

Xuan Li, Department of Interventional Vascular Surgery, Peking University International Hospital, Changping District, Beijing, 102206, China, E-mail: 18701120201@163.com

Received Date: 07 Apr 2022

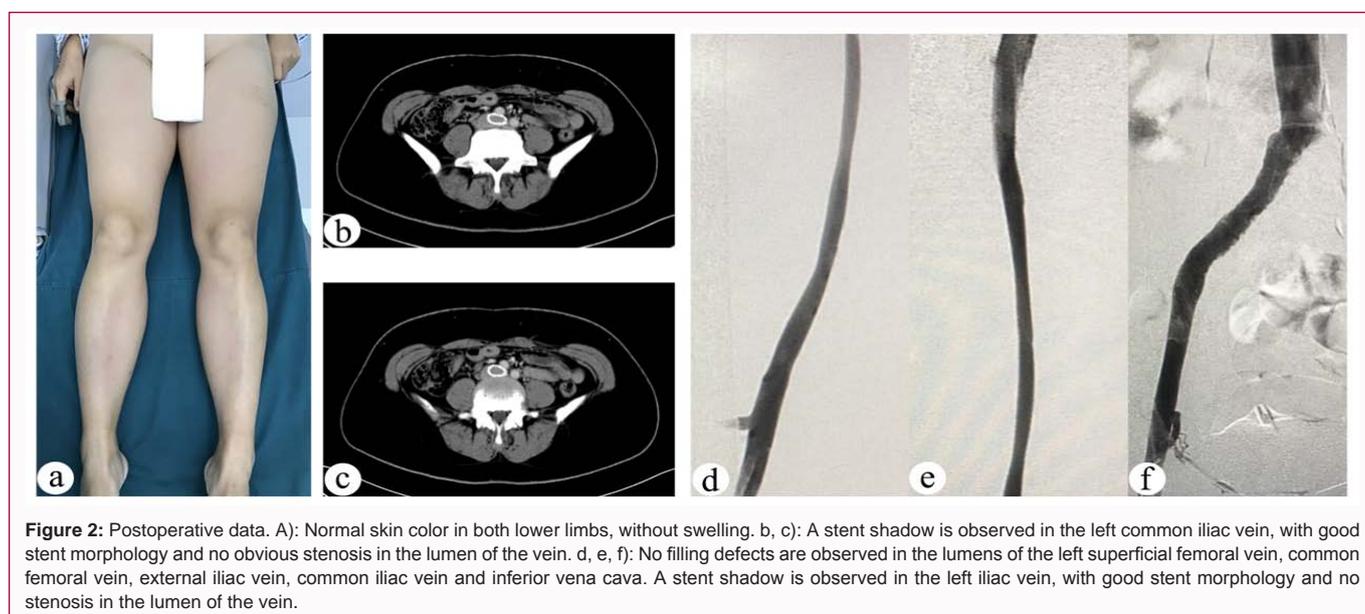
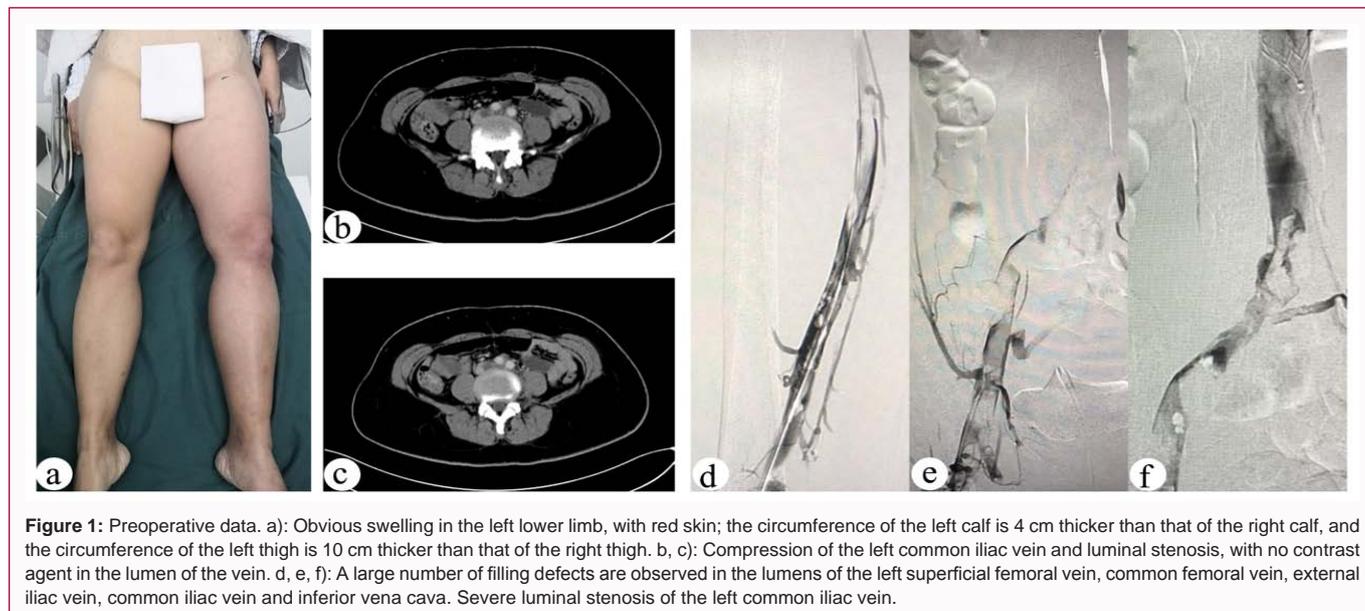
Accepted Date: 02 May 2022

Published Date: 05 May 2022

Citation:

Zhao P, Lin L, Zhang H, Zhang Z, Li X. Deep Vein Thrombosis with Iliac Vein Compression Syndrome in Early Pregnancy: A Case Report. *Clin Case Rep Int.* 2022; 6: 1323.

Copyright © 2022 Xuan Li. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



ultrasound indicated thromboses of the left iliac vein, femoral vein, popliteal vein and intermuscular veins of the calf. She denied past and family history of VTE and did not take oral contraceptives containing estrogen.

Diagnosis and treatment plan

Vascular surgeons and obstetricians and gynecologists jointly determined to first perform temporary inferior vena cava filter placement as emergency treatment to prevent a fatal PE, followed by an emergency abortion, anticoagulation treatment if there was no serious bleeding after the abortion, and last thrombectomy.

Diagnosis and treatment

1) Temporary inferior vena cava filter placement was performed, and the distal thrombosis of the inferior *vena cava* was found by intraoperative angiography. (Radiation dose: 12 mGy). 2) The patient was immediately transferred to the obstetrics and gynecology operating room for an induced abortion. Because the patient had

no significant bleeding after the operation, she was immediately administered enoxaparin sodium (6000 IU). Bleeding did not increase after anticoagulation treatment. 3) Contrast-enhanced Computed Tomography (CT) revealed compression of the left common iliac vein (Figure 1). 4) Medical and mechanical thrombectomy and iliac vein stent implantation were performed 12 h after the induced abortion. During the operation, the patient was placed in a prone position and intravenously injected with heparin (3000 IU). After local anesthesia, angiography was performed *via* left popliteal vein puncture, and a massive thrombosis was found in the distal end of the left femoral vein, iliac vein, and inferior vena cava (Figure 1). An AngioJet SOLENT Thrombectomy Sets catheter was inserted, and urokinase (250,000 IU) was injected (spray mode) into the thrombotic segment. After 20 min, mechanical thrombectomy was performed using the suction mode. The angiography results indicated satisfactory thrombectomy but slow blood flow and severe stenosis in the left common iliac vein. The pressure in the inferior *vena cava* was

approximately 6 cm H₂O, and that in the left external iliac vein was approximately 15 cm H₂O. Considering the severe compression of the left iliac vein, a 14 mm to 40 mm balloon was inserted to predilate the stenotic segment of the iliac vein, and a 14 mm-100 mm self-expanding stent was implanted in the stenotic segment. Postoperative angiography showed satisfactory removal of the venous thrombosis in the lower limbs, a good blood flow rate, and no obvious luminal stenosis (Figure 2). The pressure in the left external iliac vein was approximately 7 cm H₂O (radiation dose: 180 mGy). No significant vaginal bleeding was observed during the operation. 5) Enoxaparin sodium (6000 IU, q12h) was administered after thrombectomy. 6) A thrombophilia-related examination was performed. Protein S activity was 38.7% (reference range 63.5%-149%), and there were no abnormalities in antithrombin III, protein C, and APS-related antibodies. The result of the thrombophilia-related gene test was negative. Eight days after thrombectomy, both lower limbs were not swollen, with equal circumferences (Figure 2), and the D-dimer concentration was 116 ng/ml; color Doppler ultrasound showed no thrombosis in the veins of both lower limbs and patent blood flow through the left iliac vein stent. 7) Eight days after thrombectomy, the inferior *vena cava* filter was removed, and enoxaparin sodium (6000 IU q12h) was administered postoperatively. 8) Thirty days after thrombectomy, the D-dimer concentration was 47 ng/ml; color Doppler ultrasound showed no thrombosis in the veins of both lower limbs and patent blood flow through the left iliac vein stent; contrast-enhanced CT showed satisfactory shape and location of the left iliac vein, patent blood flow through the stent, and relief of compression of the left iliac vein (Figure 2). The patient was administered rivaroxaban (20 mg qd) as an anticoagulant. 9) The examination at 3 months after thrombectomy showed no swelling in the lower limbs. The patient no longer felt heavy, sore or swollen legs, and her menstrual flow was normal. The D-dimer concentration was 45 ng/ml. Color Doppler ultrasound showed no thrombosis in the veins of both lower limbs, no deep venous return, and patent flow through the left iliac vein stent.

Discussion

Increased risk of DVT during gestation

A series of changes during the perinatal period, such as hypercoagulability, uterine enlargement that compresses the inferior vena cava and pelvic vein, and venous stasis, increase the risk of thrombosis. VTE is the leading cause of maternal death, and the incidence of VTE is 4 to 5 times higher during gestation than in the non-gestation period and is even higher during puerperium. DVT accounts for 75% to 80% of VTE during the perinatal period, and it often involves the iliac-femoral vein and occurs more commonly in the left lower limb [2]. The lack of timely and accurate identification of risk factors for VTE is main reason that the incidence of and mortality associated with maternal VTE have not continued to decline worldwide over the past 2 decades.

IVCS

IVCS is common in women of childbearing age, among whom women aged 20 to 40 years account for 60% to 85% of all IVCS patients. Compared with men, women are more prone to PE [3]. Women are in a hypercoagulable state during gestation. During middle to late gestation, the enlarged uterus compresses the inferior vena cava and iliac vein, causing blood stasis in the veins of the lower limbs. The presence of IVCS further increases the risk of DVT. The severity of iliac vein stenosis varies with posture. Iliac vein stenosis is more severe in supine positions; therefore, the risk of thrombosis is

higher in pregnant women who need to stay in bed most of the time to prevent miscarriages [4]. IVCS is the leading cause of acute iliac-femoral vein thrombosis, with a true incidence rate of 18% to 49%. However, IVCS is often overlooked. Past medical history of VTE has been included as the main risk factors for VTE during the perinatal period, but the detection of IVCS has not been included in routine prenatal examinations, and the accurate identification of IVCS is essential for the prevention of VTE during the perinatal period. For women with a previous VTE or women with no previous VTE history but with the IVCS symptoms, color Doppler ultrasound or MRI should be performed to determine the presence of IVCS. For pregnant women with IVCS, preventive measures for VTE should be actively taken to reduce the incidence of DVT, but IVCS has not been listed as a risk factor in existing guidelines; therefore, related research should be designed and implemented to provide more evidence for inclusion [5].

Post-thrombosis syndrome (PTS) should not be neglected

In addition to leading to PE, if not treated effectively and in a timely manner during the acute phase, DVT can also cause venous return disorders of the limbs due to deep vein occlusion. In the process of organized repair, damaged venous valves lead to venous return, causing venous hypertension of the lower limbs and often severe sequela, known as PTS. Long-term high venous pressure in the lower limbs leads to tissue edema, the accumulation of metabolites and tissue malnutrition, mainly manifesting as heaviness, discomfort and swelling in the lower limbs, symptoms that aggravate after long-term standing or activity. Some patients may present with pain, increased muscle tension, varicose veins, pigmentation in the feet and lower legs, thickening and rough skin, pruritus and eczema-like dermatitis in/on affected limbs. Recurrent or prolonged chronic ulcers may occur in patients with severe cases. These symptoms seriously affect quality of life and result in high medical costs [6]. Once DVT is diagnosed in the perinatal period, active treatment is needed to reduce the occurrence of PTS or acute DVT, prompt and effective anticoagulation treatment together with rapid thrombus removal can quickly restore venous return and improve valve function, which are important means to treat DVT and prevent PTS.

Abnormal increase in D-dimer

D-dimer is a coagulation and fibrinolysis marker that is used to rule out VTE in patients with low to moderate clinical suspicion of VTE, and D-dimer levels gradually increase significantly during gestation, peaking during late gestation. However, the use of this biomarker in pregnant women has limitations [7]. The patient reported herein had an unplanned pregnancy. Her coagulation tests prior to the abortion revealed a significant elevation in D-dimer, but the elevation in D-dimer was not addressed. The patient had severe DVT 5 days later. Abnormally high D-dimer concentrations in women should not be ignored, and VTE management should be pursued for women who wish to undergo an abortion and those who have undergone abortions. A VTE risk assessment should be conducted at the earliest possible time for all pregnant women [8].

Conclusion

This case indicates that clinicians should be alert to the risk of DVT during early pregnancy and attach great importance to DVT management during the perinatal period. It is of great significance to screen for IVCS for the prevention and treatment of DVT. Once VTE occurs during the perinatal period, clinicians should closely monitor and actively treat such patients, so as to reduce the mortality rate and

the occurrence of thrombosis recurrence and PTS.

References

1. Esposito A, Charisis N, Kantarovsky A, Uhl JF, Labropoulos N. A comprehensive review of the pathophysiology and clinical importance of iliac vein obstruction. *Eur J Vasc Endovasc Surg.* 2020;60(1):118-25.
2. ACOG practice bulletin no. 196: Thromboembolism in pregnancy. *Obstet Gynecol.* 2018;132(4):e1-17.
3. Kaltenmeier CT, Erben Y, Indes J, Lee A, Dardik A, Sarac T, et al. Systematic review of May-Thurner syndrome with emphasis on gender differences. *J Vasc Surg Venous Lymphat Disord.* 2018;6(3):399-407e4.
4. Krzanowski M, Partyka L, Drelicharz L, Mielnik M, Frolow M, Malinowski TKP, et al. Posture commonly and considerably modifies stenosis of left common iliac and left renal veins in women diagnosed with pelvic venous disorder. *J Vasc Surg Venous Lymphat Disord.* 2019;7(6):845-52e2.
5. Radaideh Q, Patel NM, Shammam NW. Iliac vein compression: Epidemiology, diagnosis and treatment. *Vasc Health Risk Manag.* 2019;15:115-22.
6. Abe K, Kuklina EV, Hooper WC, Callaghan WM. Venous thromboembolism as a cause of severe maternal morbidity and mortality in the United States. *Semin Perinatol.* 2019;43(4):200-4.
7. Gutierrez Garcia I, Perez Canadas P, Martinez Uriarte J, Izquierdo OG, Jódar Pérez MA, de Guadiana Romualdo LG. D-dimer during pregnancy: Establishing trimester-specific reference intervals. *Scand J Clin Lab Invest.* 2018;78(6):439-42.
8. Tardy B, Buchmuller A, Bistervels IM, Ni Ainle F, Middeldorp S. Thromboprophylaxis in pregnant women: For whom and which LMWH dosage? *J Thromb Haemost.* 2019;17(8):1401-3.