CASE STUDY

May-Thurner Syndrome and Protein S Deficiency: A Case of Extensive Iliofemoral Deep Vein Thrombosis in a Young Adult

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Abstract

Venous thromboembolism is a common cardiovascular disorder that can lead to pulmonary embolism, recurrent thrombosis, and post-thrombotic syndrome (PTS), with iliofemoral deep vein thrombosis (DVT) carrying a high thrombus burden, severe symptoms, and risk of persistent venous obstruction. May-Thurner syndrome (MTS) is an anatomic cause of left-sided iliofemoral DVT due to right common iliac artery compression of the left common iliac vein, and protein S deficiency can further increase the thrombotic propensity, creating a dual-hit mechanism. This report describes the diagnostic evaluation and management of extensive iliofemoral DVT in a young adult with concomitant MTS and protein S deficiency and highlights the implications for etiological workup and combined therapy. A 27-year-old previously healthy man presented with 4 days of left lower limb pain and swelling (circumference 39 cm vs. 34 cm on the right). Doppler ultrasonography confirmed extensive thrombosis involving the common femoral, great saphenous, femoral, and popliteal veins. Laboratory testing showed leukocytosis and elevated inflammatory markers (erythrocyte sedimentation rate of 60 mm/h, C-reactive protein of 153.57 mg/L) with normal baseline coagulation indices. Hypercoagulability workup revealed factor V Leiden negativity, normal antithrombin III activity, weakly positive antinuclear antibody, and severely reduced protein S (<8%). Contrast-enhanced computed tomography venography revealed an occlusive thrombus from the left common iliac vein-inferior vena cava junction through multiple iliac and femoropopliteal segments, with iliac vein compression consistent with MTS and additional right internal iliac vein occlusion. He received heparin, streptokinase thrombolysis, thrombectomy/angioplasty, improved clinically, and was discharged on apixaban with planned venoplasty.

Key words: Anticoagulation, endovascular treatment, iliofemoral deep vein thrombosis, inherited thrombophilia, May-Thurner syndrome, protein S deficiency

INTRODUCTION

Venous thromboembolism, including deep vein thrombosis (DVT) and pulmonary embolism, is a prevalent cardiovascular condition with an annual rate of 1–2/1,000 individuals. It remains a significant contributor to short- and long-term health complications. Pulmonary embolism, recurrent thrombosis, and post-thrombotic syndrome (PTS) are critical consequences, as they impair functional outcomes and quality of life.[1,2]

Iliofemoral DVT, affecting the iliac and common femoral veins, is a severe form of proximal lower extremity thrombosis. Compared with distal DVT, it has a larger thrombus load, intense limb symptoms, and a higher likelihood of venous occlusion and PTS, highlighting the need for early detection and restoration of venous flow.[1,3] For patients with acute symptomatic iliofemoral DVT and low bleeding risk, catheter-based thrombus removal methods

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Received: 25-05-2026
Revised: 23-06-2026
Accepted: 29-06-2026

may be considered with anticoagulation, particularly with significant iliac occlusion.[2,4]

May-Thurner syndrome (MTS), or iliac vein compression syndrome, is an anatomical cause of left-sided iliofemoral DVT, in which the right common iliac artery compresses the left common iliac vein against the vertebral body. This compression leads to venous stasis, endothelial damage, and intraluminal changes, increasing the risk of thrombosis.[5,6] MTS accounts for a small but significant portion of lower extremity DVT cases, especially in younger patients with extensive left-sided iliofemoral thrombosis.[5,7] As duplex ultrasonography may not reveal iliac lesions, cross-sectional or intravascular imaging is often necessary for diagnosis and treatment.[6,8]

Inherited thrombophilia can elevate thrombotic risk. Protein S deficiency is a hereditary disorder affecting the protein C anticoagulant pathway and is linked to early onset or recurrent venous thromboembolism.[9] When protein S deficiency coexists with MTS, it creates a dual-hit mechanism: Venous outflow obstruction provides the anatomical basis for thrombosis, while systemic hypercoagulability reduces the threshold for clot formation and may increase thrombus extent or recurrence risk.[10]

This coexistence has significant implications. In patients with extensive left iliofemoral DVT, especially without strong provoking factors, evaluation of iliac venous compression and inherited thrombophilia is advisable. Experience indicates that when MTS coexists with protein C and/or protein S deficiency, anticoagulation alone may not suffice; management often requires thrombus removal with correction of iliac obstruction through angioplasty and stenting.[4,10,11]

This report details a case of iliofemoral DVT associated with MTS and protein S deficiency in a young adult. This case underscores the need for thorough etiological assessment in young individuals with unexplained DVT and highlights the importance of integrating pharmacological and endovascular treatments.

CASE PRESENTATION

A 27-year-old man with no health issues presented to the hospital with left lower limb pain persisting for 4 days. He had been healthy until he experienced sudden throbbing pain in his left leg from the hip to the ankle, which worsened with activity. He did not have fever, injury, chest pain, shortness of breath, or prior thrombosis. After visiting another hospital, venous Doppler ultrasound revealed DVT. The patient was referred to our facility for treatment.

The patient had no medical or chronic illnesses and no family history of thrombotic disorders. He maintained a mixed diet with normal body functions and sleep. He smoked three cigarettes daily for 3 years but did not consume alcohol.

On admission, the patient was alert and oriented with stable vital signs: Pulse 86/min, blood pressure 110/60 mmHg, respiratory rate 18/min, and oxygen saturation 99%. His blood glucose level was 105 mg/dL. The examination revealed no pallor, jaundice, cyanosis, clubbing, lymph node enlargement, or swelling. Systemic examination was normal, with normal heart sounds, vesicular breath sounds, and a soft abdominal examination. Neurological examination revealed normal muscle tone and strength, with no deficits, and a Glasgow Coma Scale score of 15/15.

Upon examining the lower limbs, tenderness and swelling were observed in the left leg, while the right leg appeared normal. The right leg measured 34 cm in circumference, compared with 39 cm for the left leg. Palpation of the left leg revealed tenderness and edema, suggestive of DVT. Laboratory tests showed hemoglobin levels of 14.3 g/dL, leukocyte counts of 16,600 cells/mm^3, and platelet counts of 189,000 cells/mm^3. The coagulation profile showed an INR of 1.007 and prothrombin time of 12.9 s. The kidney and liver function tests were normal. Inflammatory markers were elevated, with an erythrocyte sedimentation rate of 60 mm/h and C-reactive protein of 153.57 mg/L. Venous Doppler ultrasound of the left leg revealed an echogenic thrombus with no color flow and non-compressibility in the common femoral, great saphenous, femoral, and popliteal veins, confirming extensive DVT.

A thorough evaluation for hypercoagulability revealed a weakly positive antinuclear antibody test with a nuclear speckled pattern. Antithrombin III activity was normal, and the Factor V Leiden mutation was negative. However, protein S levels were significantly low (<8%), indicating a deficiency that increases the risk of venous thromboembolism.

Contrast-enhanced computed tomography venography revealed significant venous thrombosis in the left iliac and femoral veins. Imaging revealed complete occlusive filling defects at the left common iliac vein-inferior vena cava junction, extending into the left common, external, and internal iliac, common femoral, superficial femoral, popliteal, and tibial veins. The left common iliac vein was compressed by the overlying right common iliac artery, indicating the presence of MTS [Figure 1]. Widespread subcutaneous and intramuscular edema was observed from the left lateral abdominal wall to the lower limb, suggesting venous congestion. The right internal iliac vein showed complete occlusion, whereas the other right lower limb veins showed normal opacification.

The patient was diagnosed with extensive DVT in the left lower limb, associated with MTS and protein S deficiency. The treatment began with intravenous heparin

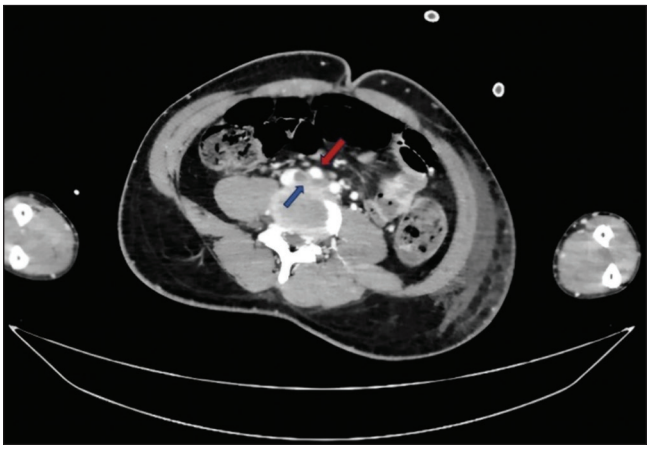

Figure 1: Axial computed tomography venogram showing May-Thurner syndrome with iliofemoral deep vein thrombosis. The red arrow indicates compression of the left common iliac vein by the right common iliac artery, and the blue arrow indicates an obstructive thrombus in the left iliac venous system

anticoagulation. Following cardiology consultation, the patient underwent successful catheter-directed thrombolysis using streptokinase, followed by heparin infusion with activated partial thromboplastin time-based dosing.

The patient then underwent a successful thrombectomy with balloon angioplasty of the left iliac vein, restoring venous patency. The patient showed significant improvement and was discharged on apixaban, with a planned venoplasty scheduled for MTS management.

This case demonstrates extensive iliofemoral DVT in a young adult caused by MTS and protein S deficiency, highlighting the importance of early diagnosis and prompt intervention to prevent complications.

DISCUSSION

This case emphasizes the importance of considering extensive left-sided iliofemoral DVT in young individuals, as it may result from both local venous blockage and systemic thrombophilia. MTS causes compression of the left common iliac vein by the right common iliac artery, leading to venous stasis and endothelial damage.[12] Protein S deficiency disrupts the protein C anticoagulant pathway and is a risk factor for early-onset venous thrombosis.[13] In this patient, these factors likely reduced the threshold for thrombosis, contributing to an extensive thrombus affecting multiple venous segments.

Acute iliofemoral DVT has a larger thrombus burden and a higher likelihood of recurrent venous obstruction than distal thrombosis.[14,15] Since iliofemoral involvement causes severe symptoms, younger patients with significant unilateral swelling, particularly on the left side, should prompt consideration of iliac venous lesions like MTS.[12,16] Studies show that MTS may coexist with thrombophilic risk factors, highlighting the need for broader etiological investigation.[17]

Although duplex ultrasonography can diagnose lower-limb DVT, it may not fully capture proximal iliac pathology. In MTS, cross-sectional imaging is needed to reveal compression and to plan treatment.[12,16] Computed tomography venography confirmed an extensive proximal thrombus and identified compression at the left common iliac vein–inferior vena cava junction. This distinction is important, as unrecognized iliac obstruction can lead to recurrent thrombosis.

Finding severe protein S deficiency complicates management. Protein S levels can be lowered by acute thrombosis and other conditions; thus, acute phase testing requires careful interpretation.[18] However, significantly reduced levels in young patients with extensive unprovoked DVT suggest hereditary thrombophilia, especially when other tests are inconclusive. Abnormal results should be confirmed during stability; however, acute findings remain crucial for risk assessment and planning.[18]

From a therapeutic standpoint, this case advocates for a combined approach rather than solely anticoagulation. While anticoagulation is fundamental in treating acute DVT, in cases of symptomatic iliofemoral thrombosis with a significant clot burden and minimal bleeding risk, interventions targeting the thrombus may enhance venous patency and alleviate symptoms.[14,15] A meta-analysis showed that catheter-directed thrombolysis offers better patency and reduced PTS compared to anticoagulation alone in certain acute lower extremity DVT cases.[19] Studies have reported high technical success with catheter-directed thrombolysis, pharmacomechanical thrombectomy, or combined methods in acute iliofemoral DVT.[20,21]

In MTS-associated thrombosis, removing the thrombus without addressing the underlying stenosis may be inadequate. Iliac compression can sustain venous hypertension and increase the risk of rethrombosis, making balloon venoplasty and iliac stenting typical components of management.[12,22] Research on MTS patients treated with catheter-directed thrombolysis and iliac stenting showed promising short- to mid-term patency, although stent occlusion remains a complication, requiring follow-up monitoring.[23] The treatment sequence includes initial heparinization, catheter-directed thrombolysis, thrombectomy, and venoplasty, which addresses both acute thrombi and anatomical lesions.

Long-term anticoagulation post-discharge is justified by proximal DVT, suspected hereditary thrombophilia, and residual anatomical risk. Although evidence comparing anticoagulant strategies in severe inherited protein S deficiency is limited, extended anticoagulation is often considered when the thrombotic risk is high.[18] Direct oral anticoagulants are increasingly used; however, the duration

should be based on confirmatory thrombophilia testing, stent status, bleeding risk, and specialist advice.

This case has key implications: Extensive left-sided iliofemoral DVT in young adults should prompt MTS evaluation;[12,16] thrombophilia testing should be selective but can influence treatment decisions in young patients with extensive thrombosis;[18] and when anatomical venous lesions coexist with hypercoagulability, management must address both components.[14,22]

This case report is limited by its focus on a single patient, which restricts its broader applicability. The thrombophilia assessment was not exhaustive, and acute thrombosis may have affected protein S levels. Despite a mildly positive antinuclear antibody test, the immunological assessment was not thorough. No long-term follow-up data are available on the recurrence, venous patency, or complications after thrombosis.

CONCLUSION

This case demonstrates how MTS and protein S deficiency can synergistically cause severe iliofemoral DVT in a healthy young adult, supporting diagnostic approaches that identify underlying causes and therapeutic strategies combining anticoagulation with endovascular treatment.

ACKNOWLEDGMENT

None.

REFERENCES

1. Kim IS, Jo WM. The role of pharmacomechanical endovascular intervention for iliofemoral vein thrombosis compared to conventional anticoagulation therapy. J Korean Med Sci 2017;32:47-53.
2. Gautier G, Douane F, David A, Perret C, Pistorius MA, Goueffic Y, *et al.* Pharmaco-mechanical catheter-directed thrombolysis versus recanalization and stenting for post thrombotic syndrome after lower limb deep vein thrombosis: A comparative study. Quant Imaging Med Surg 2022;12:1664-73.
3. Loffroy R, Falvo N, Guillen K, Galland C, Baudot X, Demaistre E, *et al.* Single-session percutaneous mechanical thrombectomy using the aspirex®S device plus stenting for acute iliofemoral deep vein thrombosis: Safety, efficacy, and mid-term outcomes. Diagnostics (Basel) 2020;10:544.
4. Roy M, Sasson M, Rosales-Velderrain A, Moon S, Grove M, King T. Pharmacomechanical thrombolysis for deep vein thrombosis in may-thurner syndrome. Innovations (Phila) 2017;12:466-71.
5. Naik A, Mian T, Abraham A, Rajput V. Iliac vein compression syndrome: An underdiagnosed cause of lower extremity deep venous thrombosis. J Hosp Med 2010;5:E12-3.
6. Foit NA, Chen QM, Cook B, Hammerberg EM. Iliofemoral deep vein thrombosis after tibial plateau fracture fixation related to undiagnosed May-Thurner syndrome: A case report. Patient Saf Surg 2013;7:12.
7. Wolpert LM, Rahmani O, Stein B, Gallagher JJ, Drezner AD. Magnetic resonance venography in the diagnosis and management of May-Thurner syndrome. Vasc Endovascular Surg 2002;36:51-7.
8. Siah TH, Chapman A. Should catheter-directed thrombolysis be the standard of care for pregnancy-related iliofemoral deep vein thrombosis? BMJ Case Rep 2018;2018:bcr2017223105.
9. Marsden K, Reyes Gil M, Bauman S, Tomsich CR, Tomsich RJ. Value of functional protein s activity assays for detection of type II protein S deficiency. Am J Clin Pathol 2024;162:S159.
10. Cho YP, Ahn JH, Choi SJ, Han MS, Jang HJ, Kim YH, *et al.* Endovascular management of iliofemoral deep venous thrombosis due to iliac vein compression syndrome in patients with protein C and/or S deficiency. J Korean Med Sci 2004;19:729-34.
11. Betzler BK, Zhang L, Chan KS, Yong E, Huang IK, Lo ZJ. Ilio-femoral deep vein thrombosis secondary to may-thurner syndrome with ipsilateral lower limb arterio-venous graft *in-situ*. Vasc Endovascular Surg 2021;55:524-8.
12. Majdalany BS, Khaja MS, Williams DM. Intravascular ultrasound-guided intervention for may-thurner syndrome. Semin Intervent Radiol 2017;34:201-7.
13. Velasco F, Rojas R, Torres A. Familial deficiency of protein S associated with thrombophilia. Med Clin (Barc) 1989;92:484-7.
14. Huang MH, Benishay ET, Desai KR. Endovascular management of acute iliofemoral deep vein thrombosis. Semin Intervent Radiol 2022;39:459-63.
15. Sagris M, Tzoumas A, Kokkinidis DG, Korosoglou G, Lichtenberg M, Tzavellas G. Invasive and pharmacological treatment of deep vein thrombosis: A scoping review. Curr Pharm Des 2022;28:778-86.
16. Akram F, Sadashiv RG. May-Thurner syndrome: An overlooked cause of venous thromboembolism. Med J Aust 2020;212:402-3.e1.
17. Raffini L, Raybagkar D, Cahill AM, Kaye R, Blumenstein M, Manno C. May-Thurner syndrome (iliac vein compression) and thrombosis in adolescents. Pediatr Blood Cancer 2006;47:834-8.
18. Petrilli CM, Heidemann L, Mack M, Durance P, Chopra V. Inpatient inherited thrombophilia testing. J Hosp Med 2016;11:801-4.
19. Li W, Chuanlin Z, Shaoyu M, Yeh CH, Liqun C, Zeju Z. Catheter-directed thrombolysis for patients with acute lower extremity deep vein thrombosis:

A meta-analysis. Rev Lat Am Enfermagem 2018;26:e2990.
20. Aldağ M, Çiloğlu U. Combined pharmacomechanical thrombectomy with selective catheter-directed thrombolysis in patients with acute proximal deep vein thrombosis. Turk Gogus Kalp Damar Cerrahisi Derg 2022;30:176-83.
21. Jeon YS, Yoon YH, Cho JY, Baek WK, Kim KH, Hong KC, *et al.* Catheter-directed thrombolysis with conventional aspiration thrombectomy for lower extremity deep vein thrombosis. Yonsei Med J 2010;51:197-201.
22. Kim MS, Park HS, Hong HP, Hyun D, Cho SK, Park KB, *et al.* Risk factors for stent occlusion after catheter-directed thrombolysis and iliac vein stenting in the treatment of May-Thurner syndrome with iliofemoral deep vein thrombosis: A retrospective cohort study. Quant Imaging Med Surg 2022;12:5420-32.
23. Ozcinar E, Dikmen N, Kayan A, Kandemir M, Saricaoglu MC. Pharmacomechanical thrombectomy and catheter-directed thrombolysis, with or without iliac vein stenting, in the treatment of acute iliofemoral deep vein thrombosis. J Cardiovasc Dev Dis 2024;11:214.

Source of Support: Nil. **Conflicts of Interest:** None declared.