

# Axillary Vein Thrombosis in a Low-Risk Patient without Elevation of D-Dimer - A Rare Case Report

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## ABSTRACT

Axillary vein thrombosis (AVT) is a rare condition that can be challenging to diagnose, especially in low-risk patients. This case report discusses a patient who presented with unilateral arm swelling and discomfort with no known medical conditions or significant thromboembolic risk factors. The initial evaluation included a D-dimer test, which was negative, leading to an initial assumption of a non-thrombotic aetiology. However, the symptoms without any alternative diagnosis prompted further investigation, including Doppler ultrasound, which confirmed the presence of AVT. This case highlights the limitations of relying solely on D-dimer levels in the diagnostic process. The findings highlight the need for clinicians to be vigilant about thrombosis in patients with unexplained symptoms in their upper extremities. This case underscores the importance of integrating clinical judgement with diagnostic imaging to ensure timely and appropriate management of venous thrombosis.

**Key Words:** Axillary vein thrombosis, Deep venous thrombosis, D-dimer, Doppler ultrasound.

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## INTRODUCTION

Deep vein thrombosis (DVT) in the upper extremity (UEDVT) is rare, with 1 to 2 cases per 100,000 annually.<sup>1,2</sup> It represents 4-10% of total DVT cases. Axillary vein thrombosis (AVT) represents 5-45% of UEDVT cases.<sup>2</sup>

Primary DVTs are idiopathic, and secondary DVTs are associated with tumours and intravenous catheters.<sup>2</sup> UEDVT can lead to post-thrombotic syndrome and pulmonary embolism (PE), carrying a high mortality rate.<sup>2</sup> The authors present a case of a previously healthy gentleman with acute upper limb swelling, a low Wells score, and a negative D-dimer diagnosed as unprovoked DVT.

## CASE REPORT

A 49-year gentleman, with no previous medical or surgical history, and no background of medicine use, presented to the Emergency Department in December 2024, with complaints of right upper limb swelling for the past three days, which was sudden in onset. He denied any trauma, numbness, pain, tingling sensations, or any other systemic symptoms. He was right-hand dominant and had no similar episodes in the past.

He was a businessman by profession, an occasional alcohol consumer, and smoked 15 cigarettes per day. The swelling was static, did not increase in size in the past three days, and there was no recent history of travel, cannulation, or intramuscular injections.

On arrival, he was vitally stable. He was triaged as category 04 per the Canadian Triage Assessment System (CTAS). He was seen in the fast-track area by our ED physician. On examination, his right forearm was swollen and tense with a circumferential diameter of 29.5 cm, 1.5 cm greater than that of the non-affected forearm, which was 28 cm. No changes in skin colour or temperature were observed. On palpation, distal pulses were palpable, and neurovascular examination was intact. Regarding joint movements, there was a full range of motion in all joints. No pain was elicited on a passive stretch of the flexors and extensors of the forearm, and the oxygen saturations detected *via* pulse oximetry were 98% from both upper extremities. The Wells score was one, scoring this for the entire limb swelling; otherwise, all the other components were negative. His workup, including complete blood count (CBC), infective markers, and D-dimer (low pre-test probability), was sent with a clinical suspicion of DVT. There was no elevation of D-dimer (0.26 µg/mL; normal range: 0.5 µg/mL). X-rays were taken to check for osteomyelitis or any bone abnormality, and the results showed no positive findings. Also, CBC, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) were reported in the normal ranges. Clinically, the suspicion of DVT was high. A Doppler ultrasound was arranged, revealing findings suggestive of right AVT (Figure 1). He was diagnosed with unprovoked DVT and started on apixaban (5 mg twice daily). He was discharged from ED after three hours, and a

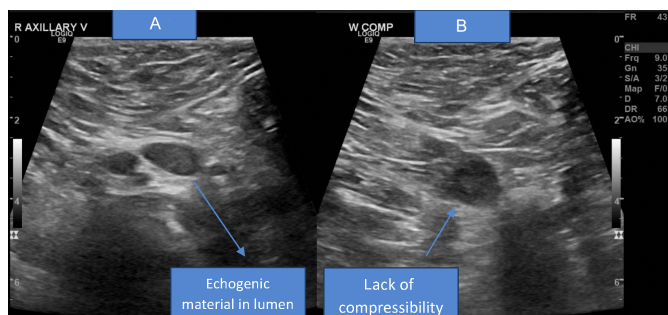
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follow-up was arranged with Internal Medicine on an outpatient basis after two weeks. Patient education leaflets and advice about the red flags and alarming signs (increase in swelling, redness, numbness, pain, or inability to do regular activities) with clear instructions to return to the ED in case of concerns were explained. Two weeks later, he was followed up in the medicine clinic and was advised to continue the same anti-coagulation. Three months later, a Doppler ultrasound was repeated on an outpatient basis, which was negative for DVT, and the patient was advised to continue the medicines with follow-up after six months to the internal medicine clinic and reporting earlier to ED in case of symptom recurrence.



**Figure 1: Doppler ultrasound of the right upper limb. (A) Presence of echogenic material in the lumen indicating thrombus. (B) Lack of compressibility of the axillary vein, suggesting thrombosis.**

## DISCUSSION

The classic symptoms of DVT are erythema, pain, swelling, and increased warmth in the affected extremity.<sup>3</sup> The Wells criterion for DVT is a risk stratification score. With this scoring system, DVT is classified as likely or unlikely or further classified into low-risk, moderate-risk, or high-risk. In either case, a DVT can be ruled out with a negative D-dimer in the low-risk or unlikely groups. However, if there is a strong clinical suspicion of DVT, an ultrasound may be advised irrespective of the D-dimer results or testing.<sup>3</sup>

Primary UEDVT causes blood flow obstruction by compressing the axillary and subclavian veins.<sup>4</sup> Blood clots are located in the subclavian vein, but can also be present in the jugular, axillary, brachial, or brachiocephalic veins in patients with secondary UEDVT.<sup>4</sup> Job-related arm positioning and repeated trauma from sports activities can predispose individuals to UEDVT.<sup>5</sup> Patients with UEDVT typically present with acute severe arm pain and swelling, although some may remain asymptomatic.<sup>6</sup>

D-dimer testing is widely used to rule out thromboembolic disease; however, its specificity can be limited, particularly in certain populations.<sup>7</sup> In this case, the negative D-dimer result may have led to an underestimation of the patient's risk for thrombosis. The diagnosis of DVT in a low-risk patient with a negative D-dimer underscores the need to maintain a high index of suspicion when evaluating patients with unexplained upper extremity symptoms. Recent literature emphasises the importance of integrating clinical judgement with diagnostic testing. For instance, a study indicated that a significant proportion of patients with venous thromboembolism may present

with negative D-dimer results.<sup>3,8</sup> D-dimer testing is less useful for UEDVT than in the lower-limb thrombosis.<sup>6</sup> In patients with suspected UEDVT in whom initial ultrasound is negative for thrombosis despite a high clinical suspicion of DVT, CT scan or magnetic resonance phlebography is recommended.<sup>6</sup>

Clinically apparent PE occurs in 5-8% of patients with UEDVT, with a mortality rate of 0.7%.<sup>9</sup> The post-thrombotic syndrome, which combines debilitating upper extremity pain and swelling, has been seen in up to 13% of patients.<sup>4,9</sup> These complications are higher in incidence for UEDVT when compared to their occurrence with lower extremity DVT.<sup>10</sup> Anticoagulation should be continued for at least 3 months with either low molecular weight heparin, vitamin K antagonists, or direct oral anticoagulants.<sup>4</sup>

This case report reiterates the complexities involved in diagnosing AVT, particularly in otherwise healthy patients who present with negative D-dimer results. Clinicians should be vigilant and consider further imaging studies, such as ultrasound, when clinical suspicion remains high despite negative laboratory findings.

Additionally, the authors recognise a limitation in this case; thrombophilia-related tests were not conducted, which prevented a clearer identification of the underlying cause of the UEDVT. Moving forward, it is crucial to perform thrombophilia assessments and ensure ongoing follow-up to better understand the aetiology and management of such cases. This approach will help in identifying potential risk factors and tailoring treatment strategies accordingly.

## PATIENT'S CONSENT:

Informed consent was taken from the patient to publish the data concerning this case.

## COMPETING INTEREST:

The authors declared no conflict of interest.

## AUTHORS' CONTRIBUTION:

NNK: Conception, drafting, analysis, and interpretation of the data.

AP: Drafting of the manuscript, critical analysis, and interpretation of the data.

ROZ: Design of the work, acquisition, and analysis.

SHH: Design of work, analysis, interpretation, and drafting of the manuscript.

All authors approved the final version of the manuscript to be published.

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