

Deep vein thrombosis secondary to abdominal aortic aneurysm

A case report

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Abstract

Rationale: Abdominal aortic aneurysm is an extremely rare cause of deep vein thrombosis. Here we report an elderly gentleman who presented with deep vein thrombosis and was found to have concomitant abdominal aortic aneurysm upon ultrasonographic screening. It illustrates the possibility of such an aetiology, and the importance of screening for such aneurysms in a select patient population before heparinization.

Patient concerns: A 73-year-old Asian gentleman with underlying hypertension, hyperlipidaemia, chronic renal failure, and history of chronic smoking presented to the emergency department with acute left lower limb swelling of 1 day. On examination, the patient was tachycardic (110 beats/minute) and hypertensive (168/84 millimeters mercury (mmHg)). The entire left lower limb was swollen with notable pitting oedema, tenderness, and warmth; left calf swelling was measured to be 4 centimeters (cm).

Diagnoses: The patient's Wells score of 4 placed him in the high-risk group for deep vein thrombosis. Serum D-dimer was subsequently found to be elevated at 926 nanograms/milliliter (ng/ml). Compression ultrasonography revealed a thrombus in the left deep femoral vein, confirming the diagnosis of deep vein thrombosis. The ultrasonographic evaluation was extended to the abdominal aorta due to the patient's high risk of abdominal aortic aneurysm, and a 7-cm aneurysm was indeed found. Further computed tomography and magnetic resonance imaging localized it to the infrarenal region, with left common iliac vein compression resulting in stagnant venous return.

Interventions: Emergency endovascular repair was performed with insertion of an inferior vena cava filter.

Outcomes: The patient was subsequently monitored in the intensive care unit and uneventfully discharged after 2 weeks.

Lessons: Such clinical presentations of deep vein thrombosis are rare, but physicians are reminded to consider screening for abdominal aneurysms and other anatomical causes before heparinization in patients who seemingly do not have thromboembolic risk factors. This is especially so for the high risk group of male deep vein thrombosis patients aged 65–75 years with a history of smoking who have yet to be screened for abdominal aortic aneurysms, in line with United States Preventive Services Task Force recommendations.

Abbreviations: cm = centimeters, mm Hg = millimeters mercury, ng/ml = nanogram per milliliter.

Keywords: abdominal aortic aneurysm, deep vein thrombosis, emergency department, ultrasonographic screening, United States preventive services task force

1. Introduction

Deep vein thrombosis refers to thrombosis occurring in the deep venous system. Its causes can be generally classified as either hereditary or acquired, though all share a common pathogenesis

pathway of Virchow triad: alterations in blood flow, vascular endothelial injury, and alterations in the constituents of blood.^[1] The common acquired causes include immobilization, cancer, and recent surgical procedures or trauma.

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ZNLG and JC-YS are the first authors. They contributed equally to this article.

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The authors have no conflicts of interests to disclose.

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Abdominal aortic aneurysms refer to segmental full-thickness dilatations of the abdominal aorta that has an aortic diameter of ≥ 3.0 cm.^[2] Its estimated prevalence is approximately 4% to 8% in men older than 50 years and 1% to 1.3% in women.^[3] Abdominal aortic aneurysms can be either asymptomatic and picked up through screening or an incidental finding, or symptomatic. Symptoms commonly include abdominal, back, or flank pain, limb ischemia, and aneurysmal rupture.

Here, we present a patient who presented to the emergency department with deep vein thrombosis secondary to an abdominal aortic aneurysm. This report illustrates the possibility of such a clinical presentation of abdominal aortic aneurysms, and the importance of screening in elderly men who have ever smoked as recommended by the United States Preventive Services Task Force before heparinization.

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2. Case report

A 73-year-old Asian gentleman with underlying hypertension, hyperlipidaemia, chronic renal failure, and history of chronic smoking presented to the emergency department with acute left lower limb swelling of 1 day. On examination, the patient was tachycardic (110 beats/minute) and hypertensive (168/84 mm Hg). The entire left lower limb was swollen with notable pitting oedema, tenderness, and warmth (Fig. 1A); left calf swelling was measured to be 4 cm. The patient's Wells score of 4 thus placed him in the high-risk group for deep vein thrombosis. Serum D-dimer was subsequently found to be elevated at 926 ng/ml.

Compression ultrasonography revealed a thrombus in the left deep femoral vein, confirming the diagnosis of deep vein thrombosis. The ultrasonographic evaluation was extended to

the abdominal aorta before heparinization due to the patient's high risk of abdominal aortic aneurysm, and a 7-cm aneurysm was indeed found. Further computed tomography and magnetic resonance imaging localized it to the infrarenal region, with left common iliac vein compression resulting in stagnant venous return (Fig. 1B). Emergency endovascular repair was performed with insertion of an inferior vena cava filter. The patient was subsequently monitored in the intensive care unit and uneventfully discharged after 2 weeks.

3. Discussion

The prevalence of abdominal aortic aneurysms for men aged above 50 years is not insignificant at 3.9% to 7.2%. These aneurysms typically are clinically silent till their spontaneous rupture leading to death in 75% to 90% of cases. Despite such catastrophic consequences of the failure to detect and treat abdominal aortic aneurysms early, effectiveness studies by the United States Preventive Services Task Force revealed that non-selective screenings were appropriate only for the patient population of men aged 65 to 75 years who have ever smoked. It therefore recommends one-time screening for aortic aneurysms in this population.^[4]

The pathogenesis of aortic aneurysms has yet to be fully elucidated, though it is generally accepted to be a multifactorial, systemic process originating from alterations in vascular wall biology and strength. Several risk factors associated with abdominal aortic aneurysms have nevertheless been identified,^[3] of which our patient has the following: older age, male gender, cigarette smoker, and underlying hypertension. The development of the identified aneurysm in the infrarenal segment of the abdominal aorta in our patient then led to compression of his left common iliac vein with stagnant venous return as shown in Figure 1B, constituting the "stasis" factor of Virchow triad.

Blood stasis was further compounded by hypercoagulability secondary to chronic renal failure in our patient, which is

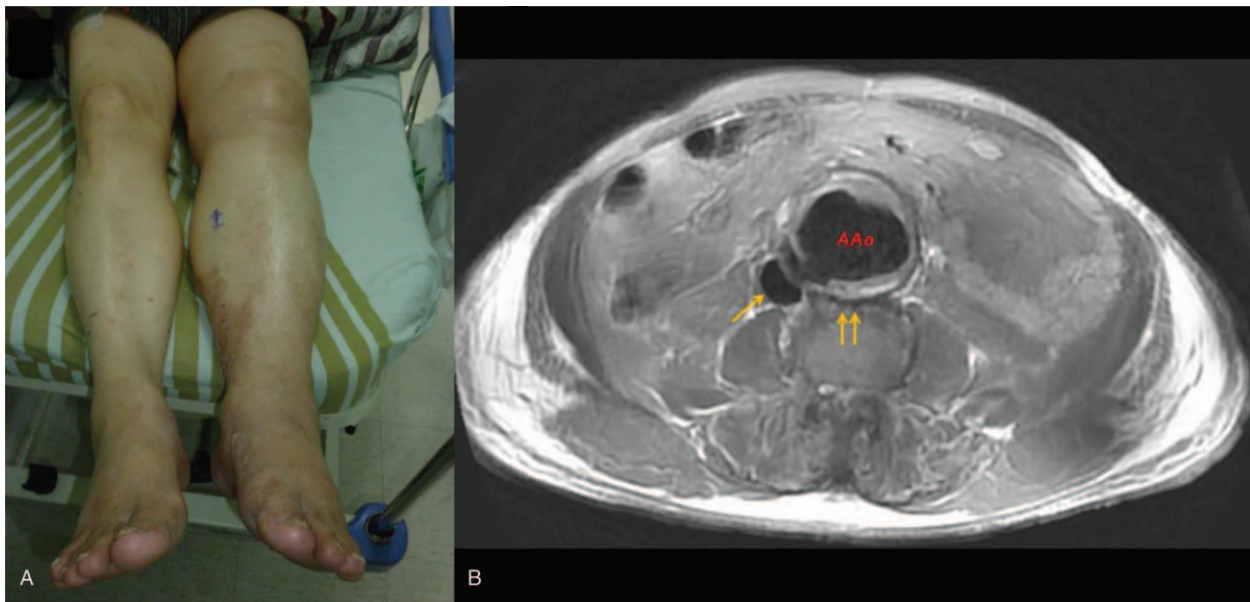


Figure 1. (A) The patient's left lower limb was swollen from calf up to upper thigh, with notable pitting edema. (B) Axial T2 weighted image of magnetic resonance scan revealed an infrarenal abdominal aortic aneurysm (AAo) with marked luminal dilatation and ulcerative plaques that displaced the right common iliac vein (single arrow) and compressed the left common iliac vein (double arrow).

associated with a relative thromboembolic risk of 1.7 as compared to patients with normal renal function.^[5] This increased risk is hypothesized to be due to elevated levels of Factor VIII and von Willebrand factor in chronic renal disease patients.^[6] These factors ultimately resulted in extensive deep vein thrombosis in our patient manifesting as acute swelling of his left lower limb.

Physicians should keep in mind that deep vein thrombosis can be caused by abdominal aortic aneurysms.^[7] This is especially so if the patient seemingly does not have other risk factors typically associated with deep vein thrombosis. Our case report further illustrates the merits of the United States Preventive Services Task Force's recommendation of performing a one-off screening for aortic aneurysms in elderly male patients who have ever smoked.

The recognition and diagnosis of this patient's abdominal aortic aneurysm prior to treatment of his deep vein thrombosis was crucial to his management. Based on treatment protocols, deep vein thrombosis is a medical emergency that requires immediate heparinization to minimize the risk of a life-threatening embolization.^[8,9] Yet, anticoagulants are generally contraindicated in surgical procedures. Administration of anticoagulants prior to discovery of the aneurysm would have greatly complicated our patient's management, in that the emergency endovascular surgical repair of the aneurysm would have had to be delayed till his coagulation profile returns to normal. His mortality risk would have been further compounded by the high risk of aneurysmal rupture, estimated at 20% to 40% annually for his aneurysm of diameter 7cm.^[10] Our adherence to the United States Preventive Services Task Force's recommendation in this patient with high risk of abdominal aortic aneurysm therefore helped to identify the aneurysm prior to initiation of anticoagulant therapy, averting the tragedy of an inoperable abdominal aortic aneurysm rupture and subsequent near-certain death.

4. Conclusion

We report a case of deep vein thrombosis caused by an abdominal aortic aneurysm. Such clinical presentations of deep vein thrombosis are rare, but physicians are reminded to consider screening for abdominal aneurysms and other anatomical causes before heparinization in patients who seemingly do not have thromboembolic risk factors. This is especially so for the high risk group of male deep vein thrombosis patients aged 65 to 75 years with a history of smoking who have yet to be screened for

abdominal aortic aneurysms, in line with United States Preventive Services Task Force recommendations.

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