Case Report

Atypical Back Pain in a Healthy American Soldier

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Abstract

Inferior vena cava agenesis (IVCA) has 5% prevalence in individuals, less than 30 years of age with unprovoked lower extremity deep vein thrombosis (DVT). One study revealed that eight out of ten patients with IVCA-associated DVT developed abdominal and/or back pain after major, intense physical activity. This case is the first identifiable report of a patient with bilateral extremity DVT through the pelvis into the distal IVC. A 22 year old male U.S. soldier presented to the clinic describing excruciating lower back pain and swelling that progressed to bilateral leg pain and swelling over a five day period. Ultrasound revealed diffuse bilateral DVTs. On admission tissue plasminogen activator (t-PA) was given through the femoral artery and a heparin regime was initiated. The patient decompensated with worsening back, abdominal and scrotal pain combined with breathing difficulties and was transferred to another facility. Imaging results revealed diffuse thrombotic disease with IVCA. The soldier was diagnosed with DVT secondary to congenital agenesis/atresia of the IVC that caused spontaneous development of bilateral venous thrombi from the posterior calf through the iliac veins as a result of repeated insults from strenuous exertional exercise.

ABBREVIATIONS

IVCA: Inferior Vena Cava Agenesis; DVT: Deep Vein Thrombosis; t-PA: Tissue Plasminogen Activator; IVC: Inferior Vena Cava

INTRODUCTION

Since the mid-2000s, low back pain has been a leading cause of medical visits and lost duty days (11 million) from injury [1]. Atypical back pain can be easily misdiagnosed in a normal healthy-appearing patient. Among soldiers with their increased operational tempo and high physical demands, diagnosis is more difficult. Initial treatment for back pain is typically supportive with stretching exercises and non-steroidal anti-inflammatory drugs with approximately 25% of all patients referred for imaging [2].

In a 2010 review, 62 patients with inferior vena cava agenesis (IVCA)-associated deep vein thrombosis (DVT) were reported; a meta-analysis revealed IVCA characteristics of young adults, particularly males and often following major physical exertion, including acute abdominal or back pain [3].

Spontaneous thromboembolism is most commonly seen in individuals with specific risk factors such as smoking, pregnancy or postoperative status. A thrombotic state requires components of "Virchow's Triad" to develop that includes abnormal blood flow, abnormal blood vessel walls and interaction with blood constituents. Without known risk factors, coagulopathies or malignancies are the usual culprits to clot formation. In the following case we present a U.S. soldier with an exercise induced DVT that worsened with heparin induced thrombocytopenia (HIT), a prothrombotic state.

CASE PRESENTATION

A healthy 22 year old male U.S. soldier developed diffuse bilateral DVT from the posterior calf through the pelvis to the inferior vena cava (IVC). The patient presented to the clinic with excruciating lower back pain and "back swelling" after weight-lifting. The soldier reported symptoms lasting over six months that included calf pain and light-headedness while running or carrying a rucksack (a back pack full of military gear) for miles. He did not seek care because the pain improved with rest, and he had no difficulty completing military physical requirements despite the discomfort.

Upon evaluation the patient was treated with oral pain medications and if symptoms worsened directed to proceed to the Emergency Room (ER). On two different occasions he went
to the ER and each time radiographs were obtained. However, on both occasions he was treated for a back sprain and asked to follow-up with his Primary Care Manager (PCM).

Five days after his second ER visit, the patient was again seen by his PCM for continued worsening back and leg pain with bilateral leg swelling and difficulty standing and ambulation. He was sent to the ER where an ultrasound showed diffuse thrombosis of both lower extremities. The soldier was hospitalized and tissue plasminogen activator (t-PA) was administered through both femoral veins; he was also started on subcutaneous heparin. As each dose of heparin was administered the patient felt flush and complained about generalized discomfort. Laboratory results found a declining platelet count.

It was determined that the soldier had developed heparin induced thrombocytopenia (HIT) with worsening thrombotic disease and he was transferred to another medical institution for further treatment (Figure 1).

While hospitalized oral anticoagulation with warfarin and fondaparinux sodium solution was administered and a full laboratory and radiologic evaluation was completed. Laboratory results validated HIT and found no predisposing hereditary coagulopathy. Results also showed the absence of identified anticoagulation proteins C and S or antibodies. Other results were unremarkable (coagulation mixing study, antithrombin 3 panel, Factor V Leiden panel, hepatitis panel, and autoantibodies for autoimmune diseases). Magnetic resonance imaging (MRI) and computed tomography scan evaluations of the chest, abdominal, and pelvic found no malignancies. The abdomen and pelvic imaging found congenital atresia of the IVC with a highly-developed collateral azygos venous system with diffuse thrombosis from the IVC through the iliac veins, pelvis, and into the legs (Figure 2). The soldier was stabilized on rivaroxaban and discharged.

He was diagnosed with DVT secondary to congenital agenesis/atresia of the IVC that caused spontaneous development of bilateral venous thrombi from the posterior calf through the iliac veins secondary to strenuous exertional exercise which acutely worsened with the introduction of HIT.

This soldier will require continued medication treatment throughout his life with restrictions of any high impact physical activity. This soldier was medically discharged from his military duties.

**DISCUSSION**

Atypical back pain can be easily misdiagnosed in a normal healthy-appearing patient. Among soldiers with a demanding operational tempo and physical requirements, the diagnosis is much more difficult. Soldiers routinely acquire back injuries of varying severities with a vascular pathology, such as IVCA, being one of the lowest differential diagnoses to be considered for lower back pain in any population to include a normally active and healthy-appearing young soldier.

IVCA has an unclear embryologic etiology whether it’s from embryonic dysgenesis or perinatal thrombosis. Of note, patients with iliac vein thrombosis and IVCA may be at a higher rate of recurrence for thromboembolism [3,4].

According to several research studies, this patient’s IVCA placed him at risk for developing a DVT [2,4-6]; so when he was doing lower back power-lifting exercises it caused a venous strain and occlusion that led to the development of a thrombus. In addition to this unusual presentation; it is suspected that the prothrombotic properties of HIT worsened his clot burden and led him to decompensate with subsequent emergent transfer to another medical facility where more interventional resources were available.

When a patient receives heparin and develops thrombocytopenia antibodies can be obtained to confirm the diagnosis of HIT. However, thrombocytopenia can present 5-10 days after administration of heparin, so one should use the clinical...
presentation of the acute systemic reaction (ASR) of HIT to assist in obtaining an earlier diagnosis. ASR is a pathophysiologic process that starts immediately upon administration of heparin. ASR leads to an IgG response where antibodies develop against the PF4/heparin-complex receptors and cross-link to receptors on platelets inducing serotonin release that presents with flushing, dyspnea, light-headedness, or a generalized discomfort similar to that of serotonin syndrome seen with selective serotonin reuptake inhibitors (SSRI’s) [6].

The prothrombotic qualities of HIT, that worsened the clot burden for this patient, stems from PF4 binding to heparin sulfates on the endothelial cells, which then binds the IgG antibodies and causes endothelial damage. This process increases circulating tissue factor, and therefore, adds more substrates to the coagulation cascade extrinsic pathway for thrombin generation, and genesis behind the prothrombotic state of HIT.

Of the reported cases of IVCA with extremity DVTs there was no identifiable case documented of bilateral extremity DVT through the pelvis into the distal aspect of the IVC. The literature recommends that patients under 30 years of age be suspected of an IVC anomaly if an unprovoked iliac vein thrombosis is discovered [7]. This suspicion should lead medical providers to broaden their investigation to include IVCA.

Due to the increased risk of thromboembolic recurrence secondary to the IVCA it is highly recommended and preferred to manage this disease process with a lifelong anticoagulant if not otherwise contraindicated. Additionally therapy should include lifelong compression stockings of varying lengths and pressures depending on the extensiveness of the thrombus.

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REFERENCES


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