



Case Report

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POTS Treatment Complicated by Cardiac Thrombus and Pulmonary Embolism

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Abstract

Postural Orthostatic Tachycardia Syndrome (POTS) is defined as an increase in heart rate upon standing with orthostatic tolerance. Patients with POTS can exhibit many symptoms that require repeated IV access for fluid resuscitation. This can increase the risk of needle-driven access complications such as clot formation and pulmonary embolism. This retrospective case report will discuss one case of a patient with POTS who had complications with access lines that led to an adherent thrombus and subsequent pulmonary embolism.

Keywords: POTS; Infection; Pulmonary Embolism; Autonomic dysfunction; Thrombus**Abbreviations:** POTS: Postural Orthostatic Tachycardia Syndrome; TPN: Total Parenteral Nutrition; PE: Pulmonary Embolism; IE: Infective Endocarditis

Introduction

The functional diagnosis of POTS is made by a history of orthostatic intolerance with or without systemic symptoms, and a correlation of symptoms with a sustained increase in upright heart rate by at least 30 beats/minute (or 40 beats/minute for patients under 20 years of age) within initial 10 minutes of standing or Head-Up Tilt (HUT) without orthostatic hypotension. POTS is one of the most common disorders of the autonomic nervous system with a predominance in premenopausal women, manifesting with symptoms of fatigue, headache, palpitations, sleep disturbances, nausea, or bloating [1]. Patients may develop POTS after infection, trauma, or due to chronic autoimmune disorders. Connective tissue disorders such as Ehlers Danlos can also be associated with auto-

nomous dysfunction and POTS. There is also a correlation with mitochondrial cytopathies [2].

The underlying mechanisms of POTS are not well known. Theories have speculated that dysfunction of volume status, autoimmune abnormalities, cardiac maintenance subsequent deconditioning and maladaptive sympathoexcitation are contributors to POTS [1]. Patients with POTS are unable to coordinate balancing blood vessel constriction with heart rate response, leading to the lightheadedness, fainting, and rapid increase in heartbeat when standing [3]. There are multiple forms of POTS, including neuropathic, hyperadrenergic, hypovolemic, and secondary POTS.

There is no standardized treatment for POTS but at the forefront of management is diet with increased salt and fluid intake, medications that target the autonomic nervous system, physical therapy, cardiovascular training, and compression stockings [4]. Pharmacological treatments include fludrocortisone, midodrine, beta blockers, and pyridostigmine, [5]. Fluid resuscitation may be used in extreme cases where gastrointestinal fluid absorption is impaired. Other complications involved in treatment of POTS include line infections, sepsis, and Infective Endocarditis (IE). POTS patients may also have clots in their lines or in other areas of their bodies, including Pulmonary Embolism (PE). This is a disruption to the flow of blood in the pulmonary artery or its branches by a thrombus that originated somewhere else [6].

Catheter related thrombosis is a common complication due to central venous catheter placement [7]. In line with Virchow's triad, there is the increased risk due to endothelial damage from the mere placement of the lines, and increased stasis from the presence of the catheter and lack of limb movement are contributors. Each of these factors increases the thrombus risk in patients. A catheter related thrombosis can lead to pulmonary embolism in 10-15% of cases [7]. This retrospective case report discusses a patient with POTS who had complications with access lines that led to a large

cardiac thrombus and subsequent pulmonary embolism.

Case Presentation

The patient is a 42-year-old female with a mitochondrial disorder who was diagnosed with POTS. There is also a significant family history of autonomic dysfunction and POTS in father and sister. Throughout the course of her diagnosis, the patient had multiple lines placed including central, subclavian lines, ports, PICC lines, and midlines to manage hypovolemia and electrolyte imbalances and other symptoms. Medications used to treat the patients POTS symptoms included pyridostigmine, fludrocortisone and midodrine. Port placement and lines varied in duration, lasting several months to up to 4 years. She experienced complications such as rupture or inability to maintain the line, cracks due to mechanical falls, infections, and line infiltrations. After the replacement of her most recent subclavian line she began complaining of shortness of breath, chest pressure, and jaw swelling. CT chest revealed a 2.5 cm blood clot in the right atrium (RA) and pulmonary embolism (PE) (Figure 1). The clot in RA affected the tricuspid, and superior vena cava (Figure 2). The PE was found in the lower right lung lobe. Blood cultures were positive for *Staphylococcus aureus*. Heparin was started and the clot was removed. Prior to use of lines, the patient had no history of clots, PE, or endocarditis (Figure 1,2 & 3).



Figure 1: CT displaying right filling defect in the Right Atrium.



Figure 2: 4cm clot in the Right Atrium affecting tricuspid and superior vena cava.



Figure 3: 4 cm clot on removal.

Discussion

This case report presents the story of a patient with postural orthostatic tachycardia syndrome that developed complications subsequent to treatment of her POTS. These complications included multiple line infections, cellulitis and bacteremia as well as line related thrombosis and pulmonary embolism. This patient's mitochondrial cytopathy is likely to have contributed to her autonomic dysfunction and POTS thus requiring increased line placement for IV fluids in addition to medications. While the medications helped minimize symptoms, fluid resuscitation was periodically needed. Infection can arise from both peripheral and central venous access, the underlying mechanisms are due to the transfer of microbes down the tract, inappropriate aseptic technique, and lack of adequate dressings [3]. The timing in which catheters are placed has a positive correlation with infection risk [3]. Patients that have been diagnosed with POTS have been found to have an additional risk by being more hypercoagulable at baseline [5]. In POTS patient, IV-line access may be needed to maintain volume status, but it increases the risk of line related thrombosis and subsequent pulmonary embolism. Providers should be aware of this risk and monitor autonomic patients with lines more closely.

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Conflict of Interest

The authors have no conflict of interest to declare.

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