



Phlegmasia Cerulea Dolens: A Rare Case of Venous Thrombosis

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Introduction

- Phlegmasia cerulea dolens (PCD) is defined as an acute massive thrombosis leading to severe tissue swelling and disruption of arterial blood flow.^{1,2}
- The thrombosis is extensive and most commonly involves the iliac and femoral veins.^{1,2}
- Risk factors include malignancy, trauma, surgery, venous stasis, COVID-19, and other causes of hypercoagulable states.^{3,4} Malignancy is estimated in 20-40% of cases.^{5,6} There is no identifiable cause in 16% of patients.³
- Most commonly presents between ages 50 and 70 and is more common in females.⁶
- The condition carries risk for hypovolemic shock, compartment syndrome, ischemia, gangrene, and limb loss.^{5,6,7}
- Mortality rates are estimated to be 20-40%, with 30-50% of these due to pulmonary embolism.^{5,8,9} There is a 10 to 25% risk of amputation.^{7,9}
- It most often presents as an extremely painful, swollen and blue or purple-colored leg.^{5,6} Left-sided cases are most common.³ Can present in an upper extremity, but this is less common.¹⁰
- The diagnosis is usually made clinically, though the typical diagnostic study performed is ultrasound.^{3,8,9}
- Treatment includes leg elevation, reduction of clot burden, improving arterial blood supply, pain control, and hydration.^{5,6,9}
- Additional treatments include angioplasty, venous bypass, and fasciotomy depending on the specific case.³

Case Description

History

- 32-year-old Caucasian male complains of severe left leg pain, swelling, and red discoloration.
- Pain initially started 4 days ago but symptoms acutely worsened 3 hours ago after bending over.
- Pain radiates to groin and lower abdomen. Associated with numbness/tingling and difficulty with ambulation.
- Reports regular use of nicotine vape pen.
- Denied recent injuries, fever, chills, shortness of breath, chest pain, and history of smoking cigarettes, alcohol, or other drugs.
- Denied history of blood clots, other medical problems, past surgeries, or medications.
- Vaccinated against SARS-CoV-2.
- Family and social history unremarkable.
- Review of systems: Positive for left pedal and leg edema. Otherwise, negative except as noted above.

Physical Exam

- Vital Signs:
- Temperature: 36.9 °C (orally)
 - Pulse: 66 BPM
 - Respiratory rate: 18 BPM
 - Blood Pressure: 111/69 mmHg (right arm)
 - SpO2: 99% (on room air)
- Patient is distressed and diaphoretic.
 - Negative abnormal neuro, chest, cardiac or lung findings.
 - Nonpitting edema, mottling, and reddish discoloration of entire left leg. (Fig. 2)
 - Area is cold, rigid, and tender to palpation.
 - Severe pain that increases with active movement.
 - Decreased ROM and increased capillary refill.
 - Nonpalpable dorsalis pedis pulse, faint signal via Doppler.
 - No other abnormal findings on exam.

Diagnostic Results

- Lab Results
- D-dimer: **6982 mg/L FEU**
 - Prothrombin time: **14.5 seconds**
 - International normalized ratio: **1.3**
 - White blood cell: **12.2 X10⁹/L**
 - Total creatinine kinase: **27 U/L**
 - COVID-19 RT-PCR: **Detected**
- Imaging
- **Ultrasound:** Positive DVT observed in left common femoral, deep femoral, femoral, greater saphenous, and popliteal veins. Partially occlusive thrombus extends into the left calf. (Fig. 3)
 - **CT angiogram with runoff:** Asymmetrically diminished/absent enhancement of lower extremity arteries is seen from the level of the popliteal artery distally to the left foot.

Discussion

- Hypercoagulable states increase the risk of developing phlegmasia cerulea dolens.^{3,4} Possible etiology for this case is COVID-19 exacerbation of underlying thrombophilia. In 2020, there was found to be a 14.9% risk of DVT in patients with COVID-19.¹¹
- Proposed mechanisms of COVID-19-induced VTE include a systemic inflammatory response resulting in cytokine storm and activation of the coagulation cascade.^{12,13}
- The proposed first case of phlegmasia cerulea dolens in a COVID-19 patient occurred in September 2020, since then there have been around 15 documented cases.¹⁴
- Due to the severity of complications phlegmasia cerulea dolens must be rapidly recognized and treated when it presents. Complications can be avoided with early recognition and treatment.⁸
- Guidelines are not established due to rarity of the condition. Pharmacological thrombolysis involves administration of a thrombolytic drug, such as tissue plasminogen activator (tPA), via access through a distant IV site (systemic), or via a catheter placed directly into the thrombosed vein (catheter-directed).¹⁵
- It is reasonable to treat less severe patients or those with early physical findings with systemic thrombolytics. For those with later presentation or more severe findings should consider open or percutaneous thrombectomy.^{3,6,7}

Table 1. Differential Diagnosis

Upon Presentation	Underlying Etiology
• Deep venous thrombosis	• Phlegmasia alba dolens
• Arterial occlusion	• May-Thurner syndrome
• Rhabdomyolysis	• Factor V Leiden
• Compartment syndrome	• Protein C or S deficiency
• Necrotizing fasciitis	• Antiphospholipid antibody syndrome

Fig 1. Hospital Course

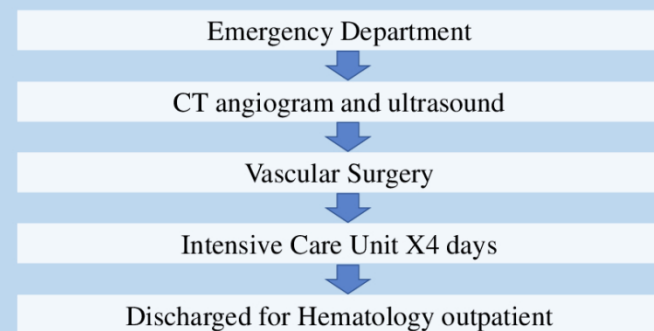


Fig 2. Lower extremities upon presentation to emergency department



Fig 3. Greater saphenous vein



Outcome

- Procedure: Tissue plasminogen activator 10 mg administered to site of clot and mechanical thrombolysis performed. Followed by angioplasty of common iliac vein and external iliac vein.
- Symptoms and swelling successfully resolved via vascular surgery.
- Administered normal saline 2,000 mL IV and continuous heparin drip at 26.76 mL/hr.
- Patient was admitted to intensive care unit for neurovascular monitoring. Multiple attempts at blood labs failed due to hemolysis.
- Patient was discharged after 4 days and prescribed warfarin 2.5 mg PO daily to prevent further thrombosis.
- Planned for follow-up by hematology in the outpatient setting to search for etiology and for further treatment.

Conclusion

- Phlegmasia cerulea dolens is a rare conditions with severe complications including hypovolemic shock, limb loss, and death.
- Risk factors include hypercoagulable states; malignancy being most the commonly associated. COVID-19 has been demonstrated to increase the risk of thromboembolism.
- Although treatment guidelines have not been established, the goals of improving arterial blood supply and preventing hypovolemic shock are essential to prevent morbidity and mortality.
- With early recognition and treatment, symptoms can be relieved, and complications can be avoided.

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