Management/Triage of Central Venous Access Device Related Upper Extremity Deep Vein Thrombosis while on Outpatient Parenteral Antimicrobial Therapy (OPAT)

Background:

Central venous access devices (CVAD) are essential to the care of our patients to facilitate the delivery of OPAT.[1] Unfortunately, such devices increase the rare but serious risk of thrombosis. The presence of a catheter is the most common cause of upper extremity deep vein thrombosis (DVT), with symptomatic venous thromboembolism (VTE) occurring in 1-5% of patients with VADs (Vascular Access Devices).

Thrombus can form within, surrounding, or at the tip of a catheter. These occlusions can be partial or complete and can impair flow through the catheter. Most fibrin sheaths and intraluminal occlusions can be lysed with intraluminal instillation of alteplase, but a mural thrombus on the vessel wall adjacent to a catheter can occlude the vein in which the catheter resides, leading to a DVT. The majority of patients with catheter-associated VTE (CA-VTE) are asymptomatic or present with catheter dysfunction, however some will present with local symptoms including swelling, pain, and erythema along the arm or neck. Complications from CA-VTE include catheter dysfunction, recurrent DVT, pulmonary embolism, infection, superior vena cava syndrome, and post-thrombotic syndrome (PTS).[2-5]

In contrast, phlebitis of the superficial veins where CVADs are inserted (basilic vein, cephalic vein) is common. Phlebitis in superficial veins is generally a benign, self-limited disorder that can be managed with symptomatic care and device removal alone.

Diagnostic Approach:

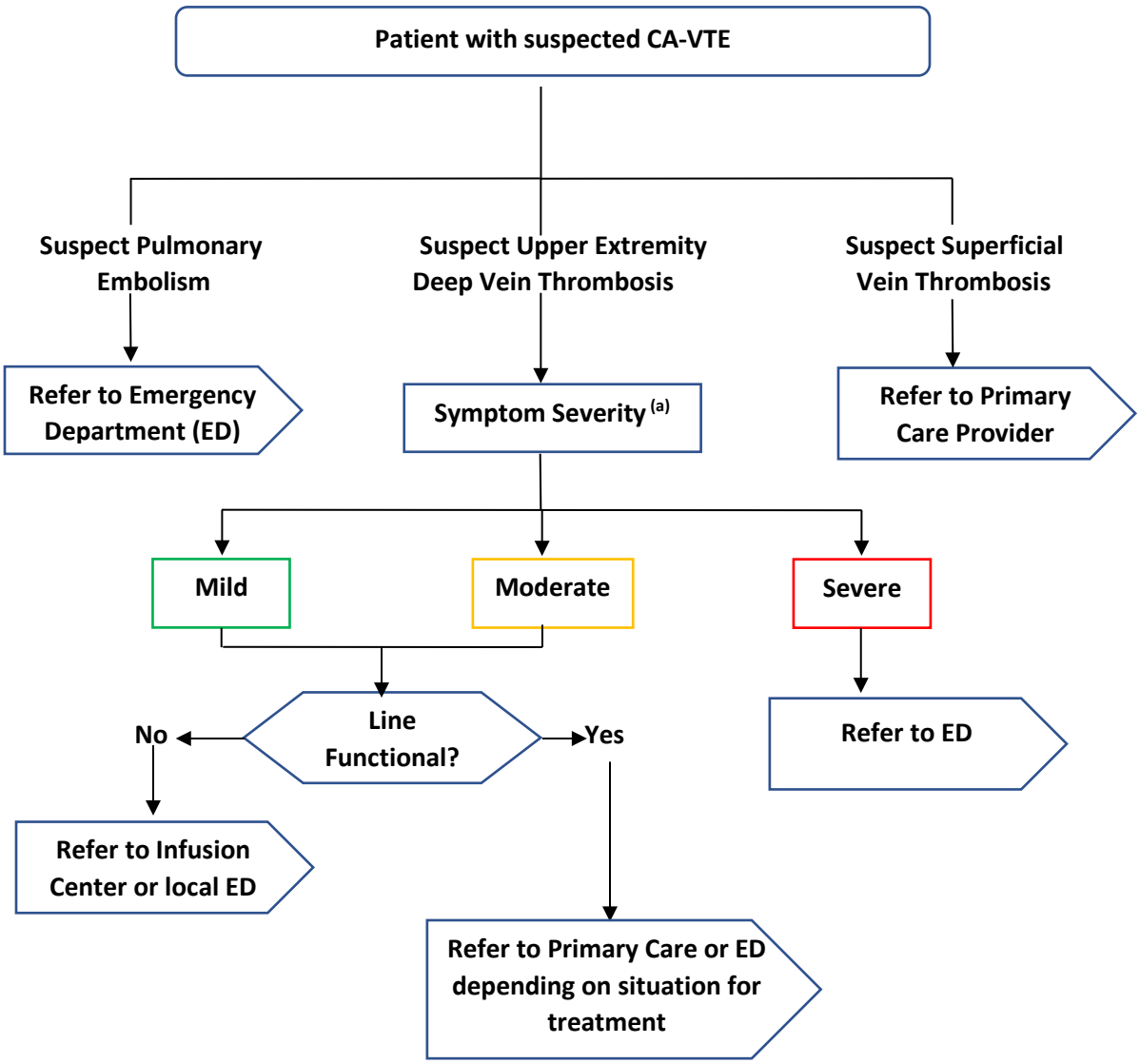
Asymptomatic CA-VTE is relatively common, and the benefit of treating it is uncertain, therefore patients should not be routinely screened or investigated for minor arm symptoms (expert opinion).[2] For symptomatic patients, evidence suggests that clinical assessment and physical exam alone are unreliable for the diagnosis of catheter associated-VTE.[2-3] Venous duplex ultrasonography remains the first-line diagnostic test. Additionally, contrast CT should be considered in patients with a negative ultrasound and high clinical suspicion of intrathoracic DVT. D-dimer should not be obtained over radiographic imaging but can be considered second to ultrasound as it has not been validated in this setting.[2-3, 5-9]

Treatment:

The goals of treatment are to reduce symptoms, preserve catheter function, minimize progression/recurrent thromboembolism, and prevent post-thrombotic syndrome. There is limited evidence to guide the treatment of catheter-associated VTE, with many recommendations coming from expert opinion and extrapolated from data for the treatment of lower extremity DVT. Regardless, there seems to be consensus that the preferred treatment strategy is anticoagulation for thrombosis involving proximal upper extremity veins (axillary, subclavian, etc.) and retaining the CVAD, if indicated. Indications to remove the catheter include concomitant CVAD-related infection, failure of symptoms to resolve with anticoagulation alone, or no need for continued vascular access.[1-9]

Current ACCP guidelines recommend a minimum of 3 months of anticoagulation, regardless of CVAD removal.[7-9] If the CVAD is not removed, then anticoagulation should continue if the CVAD remains in place, rather than stopping after 3 months of treatment. No specific recommendations exist for duration of anticoagulation prior to CVAD removal to reduce the risk of embolization, although expert opinion suggests 7 days of anticoagulation prior to removal is preferred based on patient risk. After removal, anticoagulation is recommended to be continued for 3 months.[7-9]

Triage/Management Algorithm



(a) **Symptom severity stratification**

Mild	-Mild localized pain/discomfort -Mild arm swelling, trace edema -Distal erythema or mild discoloration
Moderate	-Moderate localized pain/discomfort -Moderate arm swelling -Diffuse erythema
Severe	-Severe pain, jaw or shoulder pain, or loss of sensation -Swelling of head/neck/limb -Headaches/head fullness -Fever

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