

*CASE: 35 year old man with end-stage renal disease, on hemodialysis, is admitted to the hospital with a swollen LUE. The left-sided AV fistula was recently manipulated. How would you evaluate and treat this patient?*

## Deep Venous Thrombosis (DVT)

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**Clinical Findings:** Patients with DVT can present with a unilateral swollen extremity, redness, and tenderness to palpation over site. There may be low-grade fever. Exam may be otherwise unremarkable. None of these findings are very sensitive nor specific.

**Risk factors:** Oral contraceptives, pregnancy/post-partum, hormone-replacement therapy (HRT), smoking, malignancies, vasculitides, hypercoagulable states, recent surgery, trauma, immobilization, obesity, hyperviscosity, nephrotic syndrome, congestive heart failure; age > 75. Remember Virchow's triad: stasis, hypercoagulability, endothelial injury.

Wells Criteria<sup>6</sup>. Use to help guide workup. Total of 2 or more points= likely DVT; <2= unlikely DVT.

Active cancer (received treatment within last 6 months or on current palliative treatment)	+1
Paralysis, paresis, or recent casting of lower extremities	+1
Recently bedridden for >3 days or major surgery within last 3 months requiring anesthesia	+1
Localized tenderness along distribution of deep venous system	+1
Entire leg is swollen	+1
Symptomatic calf > 3cm greater circumference than asymptomatic leg	+1
Pitting edema only in symptomatic leg	+1
Collateral superficial veins	+1
Previously documented DVT	+1
Alternative diagnosis at least as likely as DVT	-2

### Diagnosis

- D-dimer is a good test if pretest probability is low; negative D-dimer can rule out DVT in these cases. Not helpful if negative despite high pre-test probability, e.g. cancer. Use D-dimer with another study such as Doppler. Only of utility within first 72 hours after admission.
- First line test is Doppler ultrasound of affected area; repeat Doppler in 5-7 days recommended in suspected distal DVT, with high pre-test probability and negative initial Doppler.
- Consider MRI when habitus limits Doppler study and pre-test probability high.
- Impedence plethysmography for LE is rarely done
- Consider venography if inconclusive Doppler and high pre-test probability
- Consider evaluation for hypercoagulable state. Initiate the full workup in: patients age < 50 years with first DVT; recurrent DVT; if first degree relative with history of DVT/PE; DVT associated with oral contraceptives, pregnancy, hormone replacement therapy; and DVT in an unusual location eg portal, mesenteric vessels. Check antithrombin III, Protein C & S, prothrombin mutation, homocysteine, Factor V Leiden, antiphospholipid antibodies. Consider Factor VIII, X, I lipoprotein (a).
  - wait until at least 2 weeks after the patient has finished course of anticoagulation therapy to allow for accurate test results.

## Treatment Options

- Heparin, either unfractionated (UFH) or low molecular weight (LMWH) is standard, first-line acute therapy. Continue until therapeutic level reached with an oral anticoagulant. Initiate heparin empirically in patients with high pretest probability for DVT. Don't use LMWH in renal failure or creatinine clearance < 30 without following anti-Factor Xa levels due to risk of accumulation and bleeding. Do not modify LMWH doses for obesity up to 190 kg, but treat with bid regimen; > 190 kg follow antifactor Xa levels.  
heparin now being considered as first line treatment as well, further studies needed.
- Warfarin is first-line chronic therapy. Duration of therapy is controversial; treat at least 3 months. Recent trials suggest that longer duration (6-12 months) may reduce recurrence rate. For recurrent DVT treat 6-12 months and initiate hypercoagulable workup. Goal INR is 2-3. Note warfarin is a teratogen. Use LMWH/UFH in pregnant women.
- Lifelong anticoagulation: 2+ spontaneous thromboses; 1 spontaneous life-threatening thrombosis; 1 spontaneous thrombosis at an unusual site such as mesenteric, portal, or cerebral vein; or 1 spontaneous thrombosis in a patient with antithrombin deficiency, antiphospholipid antibody syndrome, or in patients with more than 1 genetic or allelic abnormality (eg Factor V Leiden heterozygosity and prothrombin G20210A).
- IVC filter: Use where anticoagulation is contraindicated, recurrence of thrombosis while on therapeutic anticoagulation, low pulmonary reserve and thus risk of not surviving pulmonary embolus. Filters are effective in the first 12 days; at 2 years there is no statistical difference in pulmonary emboli or survival. Removable filters are preferred.
- Warfarin + filter?: No good evidence on this topic. The general recommendation is to anticoagulate with warfarin if no contraindication.
- Lytics: use only if the patient is severely symptomatic with swelling or pressure; in massive iliofemoral thrombus; or if hemodynamically unstable from PE.
- Upper extremity (UE) DVT: No reliable evidence for any particular mode of treatment in non-catheter related (spontaneous) clots. ACCP 2004 recommendations include anticoagulation as you would treat a LE DVT, and consideration of lytics and SVC filter in some cases.
  - Catheter-related UE DVT: remove catheter if possible and anticoagulate for 1 month after removal, or continue anticoagulation until catheter can be removed, then 1 month additional anticoagulation. Some physicians prescribe prophylactic warfarin, 1 mg daily, or low-dose LMWH for patients with indwelling venous catheters.
- Below-knee DVT: use 6-12 weeks of empiric anticoagulation. If not possible, check serial Doppler ultrasounds over 2 weeks to ensure no clot propagation.
- Elastic compression stockings are thought to help prevent post-thrombotic (aka post-phlebotic) syndrome in patients with symptomatic DVT's, duration unclear, some advocate up to 2 years post diagnosis of DVT.

*Case Follow-up: The patient's ultrasound showed left UE DVT. Heparin drip and warfarin were initiated and dialysis fistula flow improved; the patient was discharged uneventfully. Treatment was 3-6 months.*

## Clinical Pearls

- Use clinical suspicion, history, and Wells criteria to help guide your pre-test probability D-Dimer has good negative predicative value.
- D-Dimer most useful to help rule out a DVT in outpatient or ED settings; not of utility after 72 hours of hospitalization.
- Heparin, UFH or LMWH, is first-line treatment in acute setting, warfarin treatment of choice for chronic therapy. See above for caveats/special cases.

## References

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