Catheter-Directed Thrombolysis (CDT) for Deep Vein Thrombosis (DVT)

DVT with indication for CDT—review indication and contraindication lists¹

- Consult Hematology to evaluate for CDT
- Review indication and contraindication lists
- Consult Interventional Radiology (IR)
- Ensure adequate IV access

- Draw labs: CBC, PT, PTT, fibrinogen, d-dimers, BUN, Cr, UPT, type and cross
- Start therapeutic anticoagulation per Heme recommendations (UFH vs Lovenox)
- Consult Interventional Radiology (IR)
- Admit to 4K

CDT recommended by Heme and IR?

- Yes
  - Transfer patient to PICU
  - Post CDT management by Heme/PICU
  - Anticoagulation during CDT:
    - Systemic heparin (UFH)
      - 10 units/kg/hr continuous infusion while tPA infusing (no bolus)
      - Repeat aPTT every 48-72 hours while on prophylactic dosing
      - Goal for aPTT is 40-60 seconds

- No
  - Non-Emergent
    - Admit to 4K or PICU after discussion of timing with IR
  - Emergent
    - Patient to IR suite and then directly to PICU
  - Post CDT management by IR
  - Reimage/Venogram in 24 hours

Is DVT still present?

- Yes
  - Transfer patient to PICU
  - Once tPA stopped, ↑ UFH to therapeutic dosing or discontinue UFH and start enoxaparin per Heme recommendations
  - If DVT present at 48hr, discuss need for continued CDT
  - Compression stockings applied by PICU
  - Shave removal by IR
  - Decision made to stop CDT

- No
  - Post CDT management by Heme/PICU

Anticoagulation during CDT:

- Systemic heparin (UFH)
  - 10 units/kg/hr continuous infusion while tPA infusing (no bolus)
  - Repeat aPTT every 48-72 hours while on prophylactic dosing
  - Goal for aPTT is 40-60 seconds

PICU Management:

- Q6-8hr labs: CBC, fibrinogen (keep plt >50k and fibrinogen >100)
- Q12h: D-dimer
- Q24h: Cr
- Supportive care

Post CDT management by IR

Emergent

- Patient to IR suite and then directly to PICU
- Post CDT management by Heme/PICU

Transfer to Heme or primary service

Non-Emergent

- Admit to 4K or PICU after discussion of timing with IR

Post CDT management by IR

Reimage/Venogram in 24 hours

Supportive care

Transfer patient to PICU after initiation of CDT

Once tPA stopped, ↑ UFH to therapeutic dosing or discontinue UFH and start enoxaparin per Heme recommendations

Decision made to stop CDT

Sheath removal by IR

Compression stockings applied by PICU

Transfer to Heme or primary service

Anticoagulation during CDT:

- Systemic heparin (UFH)
  - 10 units/kg/hr continuous infusion while tPA infusing (no bolus)
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PICU Management:

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- Supportive care
Indications for CDT

**Indications**

Symptoms for < 2 weeks PLUS one of the following:

- Upper extremity DVT (not catheter-related), thoracic outlet syndrome or SVC syndrome
- May-Thurner syndrome (Left lower extremity DVT)
- Extensive DVT of lower extremity (IVC to femoral DVT)
- Life or limb threatening thrombosis
- Vascular compromise
- Massive pulmonary embolism (PE) (also consider systemic thrombolysis if any delay in CDT)
  - Sustained systemic hypotension (systolic blood pressure <90 mm Hg) for at least 15 minutes or which requires inotropic support
  - Which is not primarily due to another cause, such as left ventricular dysfunction, sepsis, hypovolemia or an arrhythmia
  - Pulselessness
  - Persistent and profound bradycardia
  - Defined by the presence of a heart rate <40 bpm associated with signs of end organ hypoperfusion
- No improvement after 24-48 hr of anticoagulation therapy

**Contraindications**

- Known tPA allergy
- Any active bleeding (patients will have ooze while receiving tPA at catheter sites, etc)
- Major general surgery within 7-14 days
- CNS ischemia/bleed/neurosurgical procedure within 10-14 days
- Invasive procedure within 3 days
- Seizures within 48h
- Recent, severe trauma
- Inability to correct severe coagulopathy: PTT >2x ULN or INR >1.5, platelet <50k, fibrinogen <100
- Careful consideration in premature infants, hypertension or other risk factors for bleeding

Supportive Care during CDT

- Monitor closely for bleeding
- No IM injections, urinary catheterization, rectal temps, arterial punctures
- Avoid large dressings over line sites to ensure adequate line site checks
- Minimal patient manipulation (i.e. avoid physical therapy/CPT/bathing/weighing)
- Avoid concurrent use of coumadin, aspirin, other anti-platelet agents
- Neuro checks hourly
- Limb checks (pulses/Doppler/blood pressure) hourly if applicable
- Attention to symptoms suggestive of bleed (headache, mental status changes, abdominal pain/distension, hypotension or tachycardia, etc)
- Expect oozing from line/puncture sites, this is an indication that thrombolysis is occurring and NOT an indication to stop the TPA infusion. Consider topical thrombin/Amicar for mucocutaneous bleeding.
- Anticipate drop of 1-2 g/dl in hemoglobin and 20-50% decline in fibrinogen from baseline

Transfusion Parameters:

- Goal for fibrinogen is 20-50% decrease and d-dimer to rise with adequate therapy. If no change after 24h of tPA, consider transfusion of 10ml/kg FFP to replace plasminogen
- Neonates and infants may need FFP empirically prior to thrombolysis secondary to naturally low levels of plasminogen.
- Transfuse platelets if <50k
- Transfuse cryoprecipitate if fibrinogen <100

Alteplase (tPA) dosing per IR

- Intraprocedural bolus: 0.6mg/kg (max 10mg)
- Drip: 0.03 -0.06 mg/kg/hr (max 24 mg per 24 hr)