Post Cardiac Catheterization Arterial Thrombosis Guideline

FINAL 8.30.17

Any Patient undergoing Cardiac Catheterization procedure

Cardiac Catheterization Assessment – Day 1 of Procedure

Non palpable pulses distal to access site
(or attempted access site)

Notify Physician/Designee and assess pulses by doppler

Neurovascular (NV) Assessment

Assess for pulses and perfusion every 15 min x 4 then every 1 hr. x2 then every 4 hrs.with vital signs

Is limb Ischemic?

YES

Ischemic (Pale; Pulseless)

- Bolus Heparin at 75 units/kg
- Start Heparin infusion per Children's dosing[1]
- Obtain **Stat** Arterial Duplex Extremity Ultrasound
- Admit to ICU

US positive for Thrombus?

NO → Assess for other reasons for decreased circulation

Yes

- Recommend **tPA infusion** if not contraindicated[2]
  - **Drip:** 0.05 mg/kg/hr x 1hr then increase to 0.1 mg/kg/hr X 5 hrs. ***Max dose is 2mg/hr***
  - Notify MD when pulse returns
- **Continue anticoagulation** by decreasing Heparin to 10 units/kg/hr while tPA is being administered
- **Repeat Arterial Duplex Extremity Ultrasound in am**
- **Monitor labs per guidelines;** DIC Screen (PT, PTT, Fibrinogen, D-dimer), CBC, BUN, Creatinine
- **NV assessment** q 1hr while on Heparin drip

Ischemia Improved after 3 hrs?

No → Notify Cath Attending Consider Vascular Surgery Consult **OFF GUIDELINE**

Yes → **Continue Therapy Arterial Duplex Extremity Ultrasound on Day 2 in am**

NO

Non-Ischemic (Pink; Pulseless)

Continue NV assessment q 15 min X1 hr

Remains Pulseless?

Yes →

- Bolus Heparin at 75 units/kg
- Start Heparin infusion per Children's dosing[1]
- Monitor pulses q 15 min x 2hr
- Admit to Inpatient

No → Resume routine NV assessments

Pulseless within 2 hrs. of Heparin?

Yes →

- Continue Heparin Infusion
- **Stat** Arterial Duplex Extremity Ultrasound

No →

- **Stop** Heparin Infusion
- Resume Post cath care & routine NV assessments

US positive for Thrombus?

Yes →

- Start Lovenox per Cardiac dosing guideline[5]
- Stop Heparin Infusion 1 hr after first Lovenox dose
- Labs (CBC, Bun/CR) with Lovenox level
- **Repeat US next AM**

No →

- **Stop** Heparin
- Resume routine NV assessments
- May d/c 2 hrs after heparin discontinued and pulses present

IF THERE IS NO IMPROVEMENT OF ISCHEMIA OR RETURN OF PULSES NOTIFY ATTENDING, PT. IS OFF GUIDELINE

Day 2 Post Procedure Arterial Duplex Extremity Ultrasound completed

Thrombus Present and Ischemia Improved

- Discharge home with Lovenox once therapeutic range is reached
- Review Lovenox Teaching Sheet with Family
- If continuing thrombus, schedule for Hematology Clinic*

No Thrombus Pulses & Ischemia Improved

- **Stop** Anticoagulation
- Resume routine NV assessments
- May d/c home 4-6 hrs after Lovenox is discontinued

INTERVENTIONAL FOLLOW-UP

cathphysicians@kidsheart.com

***HEMATOLOGY CLINIC**

**** 404 785 1319 ECH Scheduler***
404 785 1200 ECH Family
****404 785 3519 SR SCHEDULER***
404 785 3240 SR FAMILY

[2]Contraindications for tPA

- Known tPA allergy
- Any active bleeding
- Major general surgery within 7-14 days
- CNS ischemia/bleed/ neurosurgical procedure within 10-14 days
- Seizures within 48 hours
- Recent, severe trauma
- Careful consideration in premature infants, patients with hypertension, or other high risk factors for bleeding
- Inability to correct Severe Coagulopathy: PTT > 2x ULN or INR > 1.5, PLT <50, Fibrinogen <100

[3] Supportive Care

- Monitor for bleeding
- Place bleeding precaution sign at head of bed
- Anticipate drop of hemoglobin of 1-2 g/dl
- Hematuria/hemoglobinuria is not uncommon
- Creatinine will likely increase. Ensure adequate hydration
- No arterial sticks or intramuscular injections
- No rectal temperatures
- Avoid placing catheters, including Foley catheters
- No NSAIDs (i.e. aspirin, ibuprofen) or other antiplatelet agents (clopidogrel)

Discharge Instructions for Patient

It is important to take your medication at around the same time each day. Do not skip or miss doses unless your doctor recommends it.

Call Post Cath clinic and tell your doctors, advance practice provider, physician assistant , and/or nurses if you are taking one of the following medications if not already prescribed by your heart doctor (these can interact with your blood thinner or increase your risk of bleeding if taken together):

- Aspirin or aspirin-containing products: Excedrin, Pepto Bismol
- Non-steroidal anti-inflammatory drugs (NSAIDs): Ibuprofen, Advil, Motrin, Aleve, Naprosyn
- Clopidogrel (Plavix®)
- Other medicines to prevent or treat blood clots

Please call:

The Cardiac Cath Clinic at (404) 785-6476 or on-call Cardiology Service at (404) 785-KIDS anytime day or night with the following symptoms:

- Symptoms of a venous blood clot such as pain, swelling or warmth to the extremity (arm or leg), facial swelling, severe headache.
- Symptoms of an arterial blood clot such as pain, swelling, change in color (pale or very blue or black) of the extremity (arm or leg), change in temperature of the extremity.
- Symptoms of a blood clot in the lung such as shortness of breath, chest pain.
- Symptoms of a stroke such as facial droop, weakness of arms or legs, speech difficulty.
- Symptoms of worsening anemia (low red blood cells) such as headache, dizziness, pale skin, decreased energy level, shortness of breath, or chest pain.

Other Instructions:

- Call our team before any invasive procedures, dental work, or surgeries so we can stop blood thinners safely.
- Bleeding precautions: No contact sports, wear helmet while riding a bicycle, no skateboards, no climbing on playground equipment, no contact during PE class, no rollercoasters.

Discharge Instructions for Provider Following up

- Case Management consult to obtain prior authorization for one month supply of enoxaparin and insulin syringes (2 doses/day n=60)
- Nursing to call family 1-2 days prior to appointment to have lovenox doses retimed to correspond with clinic times (Lovenox should be given 16hrs and 4 hrs before lab draw)
  - Heparin assay to be collected 4 hours after lovenox dose
- On Interventional Clinic visit day (2-3 weeks), prior to appointment: obtain repeat vascular ultrasound & CBC

CICU/CSU Heparin Titration Guidelines

[1]THERAPUETIC HEPARIN

Infants < 1 year

- Initial loading dose: **75 units/kg (Max dose 5,000 units)** given over 10 minutes
- Initial maintenance dose: **28 units/kg/hour**
- **Heparin assay monitoring:** goal 0.35 – 0.7 U/mL
  - 4 hours after heparin loading dose, if within range obtain another 4 hours later (8 hours after loading dose)
  - 4 hours after every infusion rate change
  - Once therapeutic, obtain daily
- Baseline CBC, PT/INR, PTT
- Daily CBC

Children > 1 year

- Initial loading dose: **75 units/kg (Max dose 5,000 units)** given over 10 minutes
- Initial maintenance dose: **20 units/kg/hour**
- **Heparin assay monitoring:** goal 0.35 – 0.7 U/mL
  - 4 hours after heparin loading dose, if within range obtain another 4 hours later (8 hours after loading dose)
  - 4 hours after every infusion rate change
  - Once therapeutic, obtain daily
- Baseline CBC, PT/INR, PTT
- Daily CBC

GUIDELINES FOR TITRATION

Therapuetic Unfractionated Heparin Dosage Tritration

Hep Assay (Units/mL)	Dosage Adjustment	Time to Repeat Heparin Assay (Anti-Xa)
<0.2	Give 50 units/kg blous and increase infusion rate by 15%	4 hours after rate change
0.21 - 0.35	Increase infusion rate by 10%	4 hours after rate change
0.35 -0.7	Keep rate the same	Daily after 2 levels 4 hours apart are in goal range
0.71-0.79	Decrease infusion by 10%	4 hours after rate change
0.8-0.89	Hold infusion for 60 minutes then decrease infusion rate by 10%	4 hours after infusion resumes
≥0.9	Hold infusion for 120 minutes then decrease infusion rate by 15%	4 hours after infusion resumes

CICU/CSU Lovenox Titration Guidelines

THERAPEUTIC LOVENOX

Infants < 1 year

- 1.5mg/kg SQ q12
- **Heparin assay monitoring:** goal 0.5 – 1 U/mL
  - Draw first level 4 hours after second therapeutic dose
  - If adjustment made, draw subsequent level 4 hours after second adjusted dose
  - Once therapeutic, obtain weekly
- Baseline CBC, PT/INR, PTT, Creatinine
- Consult Heme Onc for dosing recommendations if CrCL < 60ml/min/1.73m^2

Children > 1 year

- 1mg/kg SQ q12
- **Heparin assay monitoring:** goal 0.5 – 1 U/mL
  - Draw first level 4 hours after second therapeutic dose
  - If adjustment made, draw subsequent level 4 hours after second adjusted dose
  - Once therapeutic, obtain weekly
- Baseline CBC, PT/INR, PTT, Creatinine
- Consult Heme Onc for dosing recommendations if CrCL < 60ml/min/1.73m^2

GUIDELINES FOR LOVENOX TITRATION

Hep Assay (Units/mL)	Dosage Adjustment	Time to Repeat Heparin Assay (Anti-Xa)
<0.35	Increase dose by 25%	4 hours after 2nd dose
0.35-0.49	Increase dose by 10%	4 hours after 2nd dose
0.5-1	Keep same dosage	Next day, then 1 wk later, then monthly each 4hrs after dose
1.1-1.5	Decrease dose by 20%	Before next dose
1.6-2	Hold next dose then decrease dose by 30%	Before next dose then 4 hours after 2nd dose
>2	Hold all doses until antifactor Xa is 0.5 units/ml then decrease dose by 40%	Before next dose and every 12 hours until antifactor Xa is < 0.5 units/ml

PROPHYLACTIC LOVENOX

Infants < 1 year

- 0.75mg/kg SQ q12
- **Heparin assay monitoring:** goal 0.1 – 0.3 U/mL
  - Not required, but can be monitored and should be monitored for CrCL for < 60

Children > 1 year

- 0.5mg/kg SQ q12
- **Heparin assay monitoring:** goal 0.1 – 0.3 U/mL
  - Not required, but can be monitored and should be monitored for CrCL for < 60

ASPIRIN GUIDELINES

Recommended dosing based on weight

- < 8 kg – Aspirin 20.25 mg/day PO/NG/NJ
- > 8 – 16 kg – Aspirin 40.5 mg/day PO/NG/NJ
- > 16 kg – Aspirin 81 mg/day PO/NG/NJ