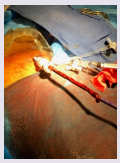
Large Bore Aspiration Thrombectomy Tips, Tricks and Pearls



Gary Ansel MD
Past System Medical Chief Vascular Services
OhioHealth
Healthcare Inroads
Boston, MA

Disclosures

- Royalties
  - Surmodics
  - Cook Medical
- SAB
  - Medtronic
  - BSC
  - Surmodics
  - Reflow Medical
  - Cordis and Ajax
- Consulting
  - Otsuka/Veryan Medical
  - Cook Medical
  - Reflow Medical
  - Akura

Thanks to The Team

- The Docs:
  - Chris Metzger
  - Joe Cambell
  - Mike Jolly
  - Chris Huff
  - John Phillips
  - Mitch Silver (emeritus)
  - Chip Botti (emeritus)
- Coordinator: Sarah
- The APPs
  - Brittnay
  - Amanda
  - Chelsea
  - Becca
  - Katherine
- Program Coordinator: Sarah

By transitioning to mechanical thrombectomy OhioHealth/Riverside

- Able to treat more PE patients
- More Immediate results
- Reduced ICU admissions/LOS
- Reduced cost of hospitalization

Pre-procedure preparation

Clinical consideration	Comments
Patient factors	1) Clinical issues which might impact procedure (i.e. mental status, back pain, ability to lay flat, obesity, lab values, etc.) 2) Patient stability 3) Unique patient characteristics – can affect usual workflow, risk, success
CT	Axial + coronal views: clot burden, characteristics, location – plan wire and catheter placement + procedural workflow
Echo	RA size, RA thrombus, PFO, RV size, function, RVSP
Duplex US	Proximal DVT that can affect access and consideration of IVC filter
Medications	1) Minimize sedation – hemodynamic effect 2) Anticoagulation – heparin bolus + drip, ACT >250 seconds
Bailout strategies	MCS, complication management

Safe Large-bore Venous Access + Closure

Vascular Access	Vascular Closure
Step 1 US-guided micropuncture access	Step 1 Horizontal mattress stitch
Step 2 Preclose and upsize to 8F sheath	Step 2 Sheath pull with manual pressure
Step 3 Consider Iliocaval venogram	Step 3 Tie down Perclose device
Step 4 Serial dilation & 24F Intri sheath	Step 4 Secure Flowstasis device

Accessing the pulmonary artery

- Place 8F sheath through the diaphragm of the sheath
- Cross into PA with .035" Swan
- Obtain PA pressure and determine CO

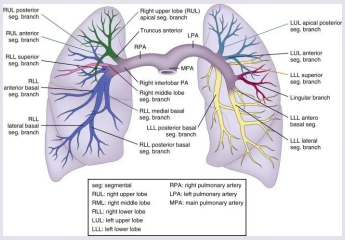
Pulmonary Angiography

- Use J wire to exchange to pigtail and perform PA angiogram if desired
  - Not needed if CT same day or if patient in extremis
  - Prefer selective left and right using DSA and 20^0 ipsilateral angulation
  - 10 cc/s for 20 cc total (can dilute if renal insuff)
- Assuming bilateral thrombus, perform start with left-sided angiogram because the right PA should be treated first.
- Once right PA angiography completed, exchange for an angulated catheter
  - Prefer a 5F 125 cm Multipurpose catheter

Wiring Tips

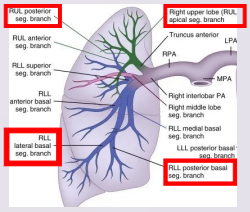
- Can try to see if a J wire passes to distal PA
  - Not always successful (especially in right PA) though safest option
- If J wire doesn't work, use a torqueable .035" wire
  - Prefer a 260 cm Glidewire Advantage and MP catheter
  - Caution with hydrophilic tip wires in the PA.
- The wire should course in a relatively straight path all the way across the shadow of the diaphragm
  - If it turns or stops abruptly before reaching the diaphragm, you are probably in the wrong branch.
  - Do not push wire against resistance → you are in a small branch
  - Critical to understand PA anatomy and when you deviate from this during case
  - RAO projection can help lay out branches in left PA
  - GENTLE injection through support catheter can sometimes help
- After wire position achieved, exchange for 1 cm soft tip Amplatz super stiff wire
  - Mark wire position with marker on foot of table
  - Catheter exchanges using fluoroscopy

Know the Typical Anatomy



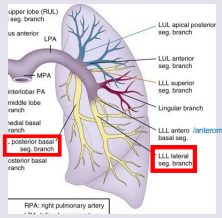
Ideal Wire Placement Based on Thrombus Location

- Truncus anterior → Posterior or apical segmental branch
- Distal right PA or interlobar → Posterior basal or lateral basal segmental branch



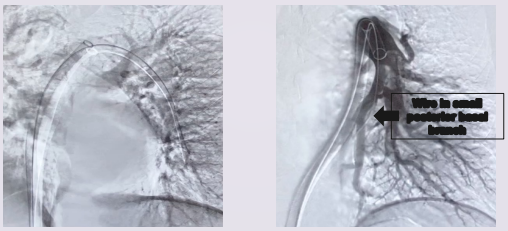
Ideal Wire Placement Based on Thrombus Location

- Left PA → Posterior basal or lateral segmental branches
- Segmental thrombus → wire that branch and use disks

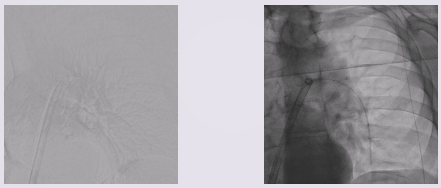


PA anatomy and proper catheter position

Value of RAO projection in Left PA



Tip injection



Small branch

Large branch

Troubleshooting catheter insertion

Problem	Solution
Resistance when advancing catheter	Likely stuck in TV apparatus 1) Stop and recross with SGC
Unable to traverse RVOT	Significant RV dilation 1) Wire position 2) T16 catheter as dilator 3) Downsize to T20 catheter if needed (rare)
Can't clear clot from TA	Catheter not coaxial 1) Keep distal wire position and back up T24 2) Wire TA with hydrophilic wire and catheter 3) Exchange for new amplatz wire 4) Readvance T24 carefully, walking over dilator

Aspiration Technique

- Advance T24 just proximal the clot, open valve and ensure bleeding.
- If there is no bleeding from the valve, then pull the catheter back.
- Aspirate, understanding you may not remove clot until the third aspiration.
- If the device must be removed from the body, pull back across the PV and TV slowly to avoid dislodging the thrombus.

Treating the Left PA

- If first pull on left unfruitful (and correct wire placement has been confirmed), use the disk.
- Let the disk dwell for 30 seconds to 1 minute before removing.
- Aspirate while removing disk, but anticipate needing a second aspiration before you see clot in the syringe.
- If thrombus remains, use the Curved catheter.

When you are done

- Repeat angiogram through the catheter using 10 cc contrast with 50 cc saline chaser.
- Pay attention to perfusion, when satisfied reassess PA pressure and CO.
- Blood loss is less of an issue (FlowSaver).

After case

- Vascular closure
- Continue AC without interruption
  - Prefer Lovenox 1 mg/kg in cath lab
  - If issue (timing, additional procedures, etc.) can continue heparin gtt
  - DOAC at discharge
- SCDs
- Remove Flowstasis device after bedrest complete
  - Start by loosening and monitor for bleeding

Other Helpful Tips

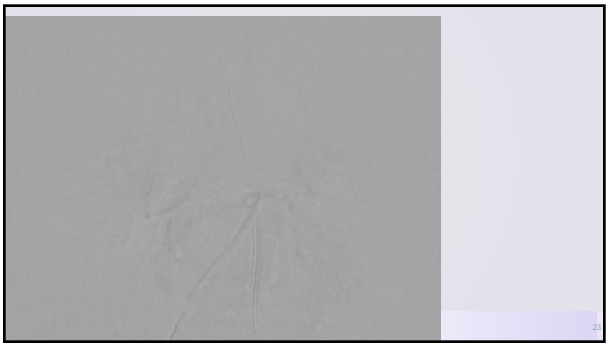
- Patients may cough/have pain when straightening PA branches. This happens more often in the left PA. Set expectations with the patient.
- If coughing persists, make sure no perforation. If there is a perforation, DO NOT REFLEXIVELY REMOVE THE WIRE. May be difficult to re-access and perform balloon tamponade or coil.
- PA pressure typically decreases post procedure, make sure you check post procedure PA sat/CO. Reasons for drop in PA pressure:
  - **Successful thrombectomy**
  - **Bleeding/volume loss**

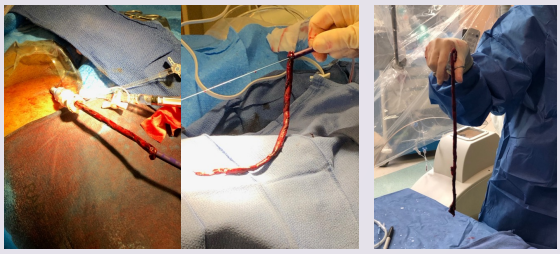
21

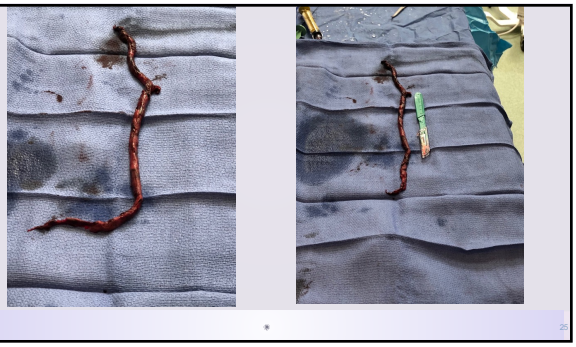
PE Case

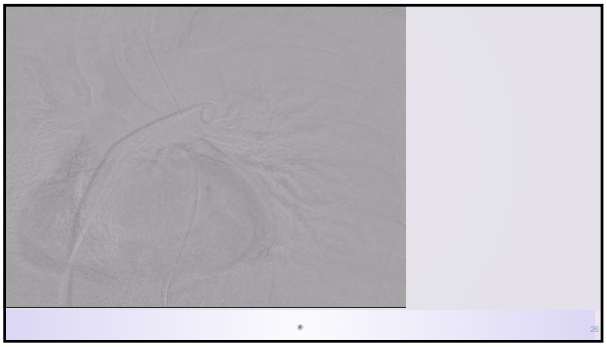
- 70 y/o male without hx of prior VTE and no known risk factors
- Syncope at home
- Brought to ER by EMS
- CTA chest revealed large PE with RV strain
- SBP 70 mmHg, O2 Sat 72% on non-rebreather.
- Intubated in ER and given full dose weight based TNKase without improvement.
- Norepinephrine infusion initiated in the ER.
- Brought to the cath lab emergently.

22

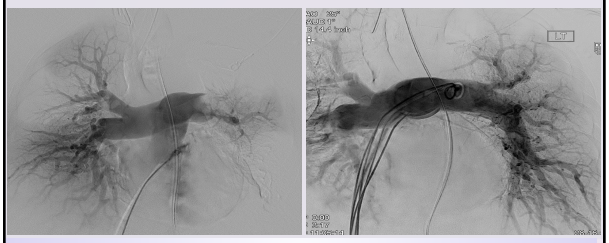








Pre/Post



Clinical Course

- PA pressure 54/23 mmHg → 40/20 mmHg; MVO2 48 → 56
- Norepinephrine discontinued in the cath lab.
- Extubated 24 hrs later.
- Venous duplex revealed right popliteal vein DVT.
- Discharged home on apixaban. Asymptomatic with normal RV function on follow-up.

The Ultimate Pearl: Get a Sarah
PE Program Coordinator – Sara Anderson, BS, RN

- Heads our PERT
- Provides feedback to EMS and referring hospitals
- Supports protocol development and management
- Education to physicians, nurses, APPs, etc
- Assists with data management