# EM Basic- Pulmonary Embolism Part 2- Risk Stratification and Treatment

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## **Risk stratification of PE**

**Non-massive-** "regular/small PE" (non-massive not used a lot in the literature/textbooks but I think it works)

-PE without any hypotension/hemodynamic instability or signs of right heart strain

**Sub-massive PE-** A PE with signs of right heart strain **WITHOUT** hypotension/hemodynamic instability

-Signs of Right Heart Strain

-Increased troponin or brain naturetic peptide (BNP)
-Signs of right heart strain on bedside echo
-Increased ventricular size (RV:LV ration 0.9 or higher)
-Bowing of the intraventricular septum into the LV

Massive PE- a PE with hypotension (systolic BP <90) or cardiac arrest



Bowing of intraventricular septum and increased RV size (Credit: <u>http://emoryeus.blogspot.com/2012/02/right-heart-strain.html</u>)

## **Treatment of PE**

Non-massive- anticoagulation

-Most common- enoxaparin (Lovenox) 1mg/kg SQ BID or 1.5 mg/kg daily (less common fondaparinaux (Arixtra))

**PEARL:** I prefer daily dosing in case patient has a bleeding complicat after admission

-Warfarin (Coumadin)- have the inpatient team start after Lovenox

**PEARL:** If you start Coumadin first, can make patient transiently hypercoagulable, it also takes days to weeks to get therapeutic anticoagulation (Lovenox is pretty much immediate)

**Inpatient vs. outpatient-** standard practice is to admit all patients with PE for monitoring and starting anticoagulation as an inpatient. Newer literature suggests that you may be able to manage non-massive PEs as outpatients with Lovenox/Coumadin or newer oral anticoagulants- this needs institutional support/protocols and primary care coordination

### Sub-massive PEs- anticoagulation

-Heparin drip- can turn infusion off if patient gets worse and needs thrombolytics

-80 units/kg IV as a bolus then 18 units/kg/hr as a drip

-Thrombolytics?- older studies did not show mortality benefit but havi a large clot in your lungs for a long time can lead to pulmonary hypertension that can make patients into pulmonary cripples

-MOPPET trial- half-dose TPA (alteplase) vs. placebo- no difference i mortality, 41% absolute risk reduction in pulmonary HTN at 6 months

-PIETHO trial- full dose TPA vs. placebo- no difference in mortality, decreased risk of cardiovascular collapse within first 7 days- higher mortality in those over 75 years old

**Thrombolytics for sub-massive PE bottom line**:- Half dose thrombolytics in those with sub-massive PE who are young and healthy with good functional status and no risk factors for increased bleeding (usual TPA contraindications) is probably a good idea and something you should offer to the patient

**PEARL:** Patients with sub-massive PE should probably go to the ICU or at least step-down with thrombolytics at their beside in case they decompensate

Massive PE- PE with hypotension (even if transient) or cardiac arrest

-In cardiac arrest- no consensus on an accepted dosing regiment- 50-100mg TPA bolus IV +/- infusion- probably best to just do 100mg TPA slow IV push over 1 minute

-Not in cardiac arrest- stop heparin drip (if started) and give TPA 100mg-10mg IV as a bolus over 1 minute, other 90mg IV over 2 hours

#### Anticoagulation before CT

**-Low risk for PE-** don't need anticoagulation before CT if you can get CT in reasonable amount of time

-Medium risk for PE- AHA says it should be considered but probably not needed if you can get CT in a reasonable amount of time- these patients have a risk of PE that's probably less than 50% and heparin/lovenox won't start to dissolve clot (only prevents clot extension/growth)

-High risk for PE and unstable- start heparin prior to CT and bring thrombolytics to the scanner as you accompany the patient, may even need to start thrombolytics prior to CT if patient is very unstableespecially if signs of right heart strain on echo.

Contact- steve@embasic.org

Twitter- @embasic