



From Knee to PE

Consideration of Thromboprophylaxis Practice After ACL Repair

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Introduction

- Over 100,000 arthroscopic ACL repairs are performed yearly in the US
- Surgery and immobilization increase risk for venous thromboembolism
- Arthroscopic procedures are associated with less VTE risk than major orthopedic surgeries.
- Unlike major orthopedic surgeries, thromboprophylaxis is not routinely recommended after arthroscopic procedures

Case Description

33 yo woman presented to ED after PEA cardiac arrest while at her outpatient physical therapy appointment, 12 days after left knee arthroscopic ACL repair. ROSC achieved after one round of chest compressions before arrival to ED.

- Only risk factor for VTE was recent surgery.

Vitals: 36.4, 126, 107/77, 31, 90s on 3L NC
77kg (BMI 28)

Exam:

Athletic build. Moderate distress. Tachycardic without murmurs or gallops. Tachypneic but moving air well throughout. No lower extremity edema, skin changes or warmth. Laparoscopic port sites over L knee are healing well without erythema/warmth/discharge. AOx4. CN II-XII intact. No focal deficits.

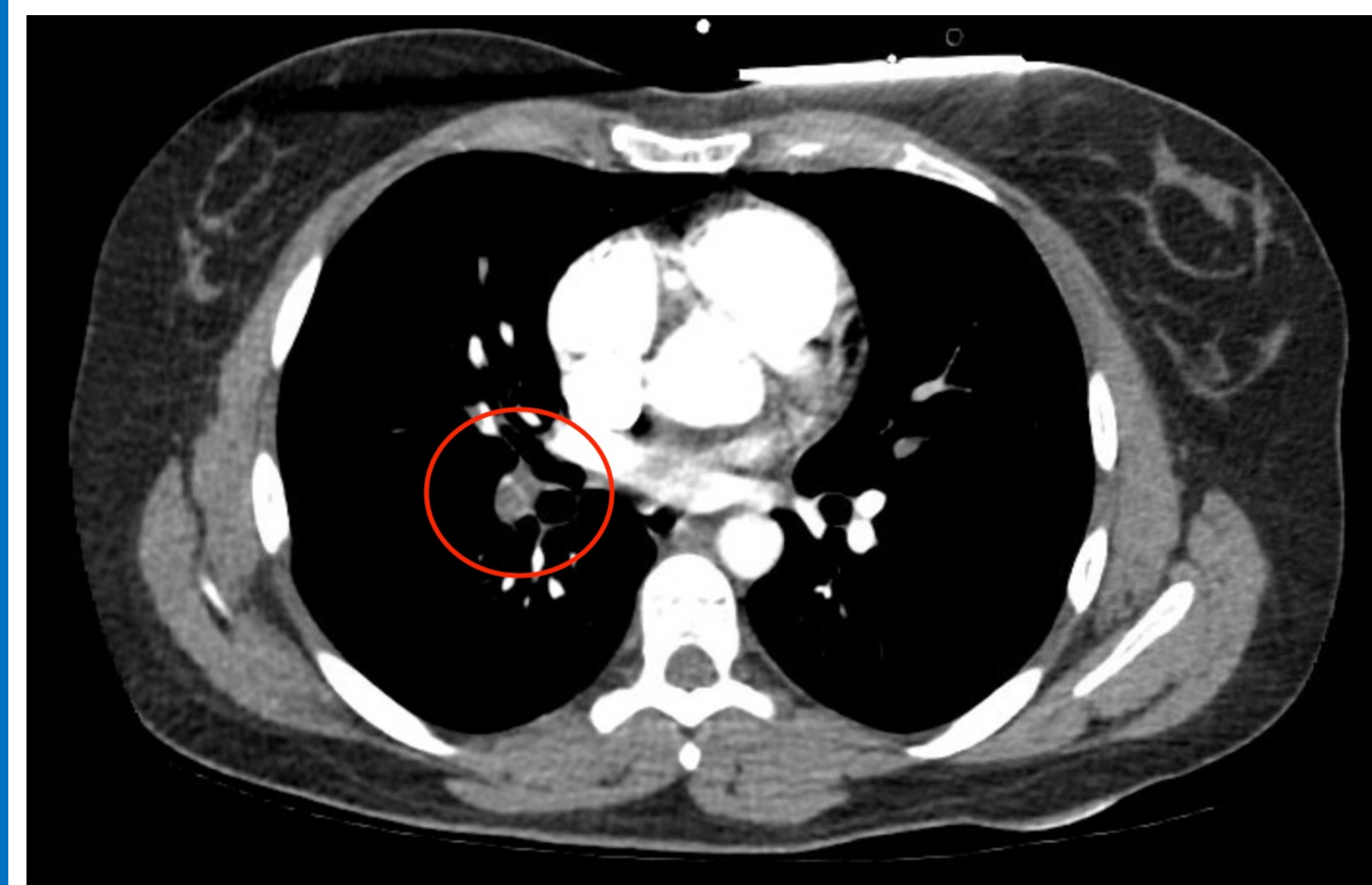
EKG: Sinus tach (129) with TWI in III and precordial leads. ST depressions in V2-V4.

Labs: CBC, CMP, coagulopathy panel all wnl.
HS-Troponin 429 -> 372

CTA chest:

Occlusive pulmonary embolism in R posterior basal segmental artery (pictured) and non-occlusive PEs in other R and L segmental branches. Evidence of right heart strain.

Lower extremity duplex US: DVT in left axial calf vein.



Hospital Course

- Diagnosis: provoked, sub-massive pulmonary embolism
- Urgent catheter directed thrombolysis with interventional radiology.
- Monitored briefly on heparin drip which was transitioned to LMWH then apixaban prior over the course of ~72 hours.
- Hematology consulted and recommended initial 3 months of anticoagulation with outpatient follow up for thrombophilia testing after completion of anticoagulation.
- Discharged on hospital day #4

Caprini Score (for perioperative VTE risk)

Source: J Endocr Surg. 2019 Dec;19(4):151-153. <https://jes-online.org/DOIx.php?id=10.16956/jes.2019.19.4.151>

Each risk factor=1 point

- Age 40-59 years
- Minor surgery planned
- BMI ≥ 30 kg/m²
- History of prior major surgery (<1 month)
- Swollen legs (current)
- Varicose veins
- Sepsis (<1 month)
- Abnormal pulmonary function (COPD)
- Acute myocardial infarction (<1 month)
- Congestive heart failure (<1 month)
- History of IBD
- Medical patient currently at bed rest

For women only (1 point each)

- Pregnant or post-partum
- History of unexplained or recurrent spontaneous abortion
- Oral contraceptives or hormone replacement therapy

Each risk factor=2 points

- Age 60-74 years
- **Arthroscopic surgery**
- Major open surgery (>45 minutes)
- Laparoscopic surgery (>45 minutes)
- Prior cancer (except non-melanoma skin cancer)
- Present cancer (except breast and thyroid)
- Confined to bed (>72 hours)
- Immobilizing plaster cast
- Central venous access

Each risk factor=3 points

- Age ≥ 75 years
- History of VTE
- Family history of VTE
- Present chemotherapy
- Positive Factor V Leiden
- Positive Prothrombin 20210A
- Positive Lupus anticoagulant
- Elevated anticardiolipin antibodies
- Elevated serum homocysteine
- HIT
- Other congenital or acquired thrombophilias

Each risk factor=5 points

- Major surgery lasting >6 hours
- Stroke (<1 month)
- Elective major lower extremity arthroplasty
- Hip, pelvis, leg fracture (<1 month)
- Acute spinal cord fracture or paralysis (<1 month)
- Multiple traumas (<1 month)

Caprini risk category based on total risk score

Total score	Category
0-4	Low
5-8	Moderate
≥ 9	High

Discussion

- Although her risk score was low (Caprini = 2) this may change after thrombophilia testing (to be completed after initial 3 month course of anticoagulation).
- Risk of VTE after ACL repair may be underappreciated. Overall risk ~9.9% (in studies that screened for this). Most are asymptomatic lower leg DVT (as in our patient). PE rate 0.1% (not screened for in most studies).
- Not all arthroscopy is the same. More involved procedures (such as ligament repair) may carry higher risk of VTE.
- Meta analysis shows thromboprophylaxis significantly reduces VTE risk in arthroscopy with ligament repair, but not arthroscopy without ligament repair. No significant change in risk of major bleeding events.
- Current guidelines do not differentiate between different arthroscopic procedures and do not consider risk factors other than prior VTE.
- In practice ~50% of US surgeons routinely provide thromboprophylaxis after ACL repair. Of these, >90% used aspirin only. Dose and duration vary greatly.
- Caprini score is a validated risk assessment model for peri-operative VTE.

Learning Points

- Current thromboprophylaxis guidelines after arthroscopy may not account for important risk factors other than prior VTE.
- Use the Caprini score for perioperative VTE risk assessment. Consider thromboprophylaxis in patients with moderate/high risk.

References

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ACCP guidelines: "For patient's undergoing knee arthroscopy without a history or prior VTE, we suggest no thromboprophylaxis rather than prophylaxis. (Grade 2B)."