DVT, PE, Anticoagulation, Thrombophilia

22 Teaching Points for the Clinician

Stephan Moll, MD

Content

1 History

2 Diagnostic Testing

3 Treatment

22 Teaching points
Disclosures

None

VTE History

“Curbside”:

“Quick question: How long would you anticoagulate a 64 year old with a basilic vein DVT after phlebotomy stick?”

Caveat!

• “Basilic vein” is NOT a deep vein.
• This patient has a superficial thromboembolitis.
Arm Clots – Basic Anatomy

Superficial Veins
- Brachial vein
- Median cubital vein
- Median forearm vein
- Median cephalic vein
- Basilic vein
- Axillary vein (a deep vein)

Deep Veins
- Subclavian vein
- Axillary vein
- Brachial veins
- Radial veins
- Ulnar veins

VTE History

“Curbside”:
“Quick question: Superficial clot in the right leg superficial femoral vein; not very symptomatic. My plan was to observe.”

Caveat!
- “Superficial femoral vein” is NOT a superficial vein.
- This pt has a proximal leg DVT.
Leg Clots – Basic Anatomy

Greater saphenous vein (GSV, medial thigh + calf)

Lesser saphenous vein (LSV, in back of calf)

Superficial veins

Deep Veins

Common iliac vein
Internal iliac vein
External iliac vein
Common femoral vein
Deep femoral vein
Femoral vein (Superficial femoral vein)
Popliteal vein
Gastrocnemius vein
Anterior tibial vein
Soleus vein
Peroneal vein
Posterior tibial vein

Proximal veins

"Trifurcation" = distal popliteal vein

Distal veins

Basics

Teaching point

Know arm and leg vein anatomy
Imaging

Doppler Ultrasound

Imaging characteristics

**Acute** (≤ days to up to 3 months)
1. Dilated vein
2. “Spongy”
3. Hypo-echoic

**Chronic**
1. Retracted vein
2. Firm clot
3. Hyper-echoic

Diagnosing recurrent DVT

- Decision is conglomerate of:
  (1) New clinical symptoms, (2) DD, (3) Doppler ultrasound

[Revis SM, ACCP guidelines, Chest 2012;141:S515-418S]
Doppler Ultrasound

- **Diagnosis:** "Brachial vein DVT"

Phone call to Doppler tech who did the study (or senior tech):

"0.5 cm clot, partially occlusive, behind a vein valve"

---

CT Scans

Question radiology reports!
CT Scans

Question radiology reports!
- 60 year old, smoker
- ED with sudden SOB
  - DD-neg
  - CTA: PE
  - Venous Doppler legs neg
- COPD treatment and anticoag.

Q: "How long to anticoagulate?"
A: "Long-term anticoagulation"

Caveats
- If CTA result does NOT match pre-test clinical assessment:
  CTA is wrong in ca. 50 % of cases

- Review CTA with best radiologist (particularly sub-segmental PE)
- "Acute" vs "chronic" PE
VQ Scan

- For chronic PE: VQ scan is test of choice
- CTA is insensitive to detect chronic PE (CTEPH)

Caveats

- VQ scan can NOT differentiate between acute and chronic
- VQ abnormalities frequently persist for months
  (of 157 PE patients, ⅔ had VQ abnormality at 3 months)[Warshski M et al. J Nucl Med 2000;41:1043-8]

Imaging

Teaching points

- Know limitations of Doppler ultrasound and CTA.
- Review imaging with Doppler technician / radiologist.
History

Conglomerate decision of:

1. VTE Risk Factors  
   A. ..., B. ..., C. ...

2. Bleeding Risk Factors  
   A. ..., B. ..., C. ...

3. Patient preference

A. ..., B. ..., C. ....
### Assessment

**Teaching points**

- Define clot.
- List thrombosis risk factors: A. …; B. …; C. …

**Example**

**VTE:** R leg prox DVT in 3-2019. VTE risk factors: A. …; B. …; C. …

**Arterial thromboembolism:** Wedge-shaped L renal infarct. Arterial thromboembolic and arteriosclerosis risk factors: A. …; B. …; C. …

### History

- Inpatient: Patient admitted for GI bleed - on warfarin.
- Consult: *“When to restart anticoagulation?”*

**Step back! First question:**

*“Does patient really need to be on long-term anticoagulation?”*
Reviewing the History

Teaching points

Question/revisit the indication/diagnosis!

- Detailed h/o each clot. Get objective records.
- Question diagnosis of “Protein C, S, AT deficiency; APLA syndrome”

Family History

- “There is no family history of bleeding or clotting”.
- “Nobody in the family had a clot”.

Teaching point

Obtain a detailed family history.
Social History

Examination

Mid-calf circumference: R > L by 2 cm
Examination

Malignancy?

1. Stockings (30/40 mm Hg)
2. CT or MR venogram
3. Angioplasty, stenting
4. Home compression pump
5. Pain Clinic (gabapentin, etc.)
6. Disability assistance
After a PE – Work-up

1. Good history
2. 3 flights of stairs with pulse oximeter
3. Cardiac echo
4. VQ scan

Pulmonary HTN Clinic
- 6 min walk test
- Pulmonary pressure measurements and angiogram

After a DVT or PE

Teaching points

1. PTS treatment: 30/40 mm stockings; venogram + stenting?
2. Recognize “post-PE syndrome” (CTEPD) and CTEPH
Woman with VTE on hormones

Non-major transient risk factor

Woman with unprovoked VTE
- DVT
- PE

Man with unprovoked VTE
- DVT
- PE

VTE due to major transient risk factor

3 months

Long-term

Recurrence Triangle

Cumulative VTE Recurrence Rate
1 yr 5 yrs
1 % 3 %
5 % 15 %
20 %
10 % 30 %
Recurrence Triangle

Teaching point

Try the "Recurrence triangle"

Duration of Anticoagulation

Conglomerate decision of:

1. Risk of recurrent VTE
   A., B., C., ...

2. Risk of Bleeding
   A., B., C., ...

3. Patient preference
Patient Preference

Warfarin "Hate Factor" and DOAC "Hate Factor" – try it.
DOAC "Hate Factor" – "What's your copay?"

Teaching point

Do NOT test ....

1. ... during an acute thrombotic episode.
2. ... a hospitalized patient.
3. ... while patient is on an anticoagulant.
4. ... if you don't know how to interpret test or what to do with results.

Thrombophilia Testing
Table 7 Influence of acute thrombosis and anticoagulants on thrombolysis test results

<table>
<thead>
<tr>
<th>Test</th>
<th>Acute thrombosis</th>
<th>Unfractionated heparin</th>
<th>Low molecular weight heparin</th>
<th>Vitamin K antagonists</th>
<th>DOACs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor V Leiden genetic test</td>
<td>Reliable*a</td>
<td>Reliable</td>
<td>Reliable</td>
<td>Reliable*b</td>
<td></td>
</tr>
<tr>
<td>APC resistance assay</td>
<td>Reliable*a</td>
<td>Reliable</td>
<td>Reliable</td>
<td>Reliable*b</td>
<td></td>
</tr>
<tr>
<td>Protein C activity</td>
<td>???f</td>
<td>Reliable</td>
<td>Low</td>
<td>Low</td>
<td>Elevated</td>
</tr>
<tr>
<td>Protein C antigen</td>
<td>???f</td>
<td>Reliable</td>
<td>Low</td>
<td>Low</td>
<td>Elevated</td>
</tr>
<tr>
<td>Protein S activity</td>
<td>???f</td>
<td>Reliable</td>
<td>Low</td>
<td>Low</td>
<td>Elevated</td>
</tr>
<tr>
<td>Antithrombin activity</td>
<td>May be low</td>
<td>Reliable</td>
<td>May be low</td>
<td>May be elevated8</td>
<td>Elevated</td>
</tr>
<tr>
<td>Lupus anticoagulant</td>
<td>Accurate9</td>
<td>???f</td>
<td>???f</td>
<td>Positive3</td>
<td></td>
</tr>
<tr>
<td>Anticardiolipin antibodies</td>
<td>Accurate9</td>
<td>Reliable</td>
<td>Reliable</td>
<td>Reliable</td>
<td></td>
</tr>
<tr>
<td>Anti-β2-glycoprotein I antibodies</td>
<td>Accurate9</td>
<td>Reliable</td>
<td>Reliable</td>
<td>Reliable</td>
<td></td>
</tr>
<tr>
<td>Homocysteine</td>
<td>Reliable</td>
<td>Reliable</td>
<td>Reliable</td>
<td>Reliable</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- a: Reliable
- b: Reliable
- f: Elevated
- q: Positive

35

36
Lupus Anticoagulant

**Teaching points**

- Be clear whom to test and when to test (“4 rules”)
- Be aware of influence of anticoagulants on thrombophilia labs
- APLA tests: Understand what exactly the lab did
   

2. "Remineralization" = Scar tissue

   However: Re-evaluation every so often (once per year).
1. VTE: Define; risk factors: A…., B…., C….

2. “Recurrence triangle”

3. Warfarin/DOAC “hate factor”

Summary: The Main Points

22 Teaching points

Comments?

Questions?
Contact Info

STEPHAN MOLL, MD
PROFESSOR OF MEDICINE
UNC THROMBOSIS PROGRAM

smoll@med.unc.edu
O 919-966-3311 | F 919-843-4896

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
SCHOOL OF MEDICINE
Division of Hematology and Oncology
Mary Ellen Jones Building | Suite 8202a | Campus Box 7035
116 Manning Drive | Chapel Hill, NC 27599