Management of Venous Thromboembolism: Key Lessons

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Department of Internal Medicine
Disclosure

Advisory Board: Pfizer

Some therapies not yet FDA approved will be discussed.
Outline

Duration of Anticoagulation
Choice of Anticoagulation
Thrombophilia testing

IVC filter placement
Outpatient versus inpatient therapy
Miscellaneous
Duration of Anticoagulation
Case #1

A 28-year old woman is seen in the clinic for “blood clot in the left leg”..

What do you want to know more?
Key history: VTE

Diagnosis: First episode/recurrent ...

Site: distal/proximal lower/upper extremity ..

Provoked: Risk factors.

Symptoms of post-thrombotic syndrome
Family history of VTE
Bleeding events
Current anticoagulation
History of abortion
Cancer screening
Case #1

Left proximal DVT
- 10 years ago
She was on OCP when she developed DVT
No bleeding on warfarin but does not like INR checks

Protein C deficiency at the time of DVT diagnosis
-provoked DVT
-estrogen level can influence protein C
Risk factors—“Provoked VTE”

Surgery, trauma, hospitalization, pregnancy…. cancer, inflammatory bowel disease, obesity..

OCP, estrogen-vaginal ring- IM high-dose progesterone

?Long distance travel (just flight)
Overview of management -ACCP guidelines

CHEST 2016; 149(2):315-352
Risk of VTE Recurrence

- Surgery: 3% at 5 years
- Nonsurgical transient risk factor: 15% at 5 years
- Unprovoked: 30% at 5 years
- Cancer: 15% annualized risk

Isolated distal DVT: half the risk of proximal DVT/PE
2nd unprovoked proximal DVT/PE: higher (1.5-fold) than 1st unprovoked event
ANNUAL risk of MAJOR bleeding on anticoagulant

Low (no bleeding risk factors) 0.8%

Moderate (one bleeding risk factor) 1.6%

High (two or more bleeding risk factors): 6.5%
Risk of bleeding

Age >65 years or >75 years
History of bleeding
Cancer
Renal or Liver failure
Thrombocytopenia or Anemia
Previous stroke
Diabetes
Antiplatelet therapy/NSAIDS; Poor anticoagulant control
Comorbidity and reduced functional capacity
Recent surgery
Frequent falls
Alcohol abuse
<table>
<thead>
<tr>
<th>Categorization of Risk of Bleeding</th>
<th>Estimated Absolute Risk of Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Risk (0 Risk Factors)</td>
</tr>
<tr>
<td>Anticoagulation 0-3 mo</td>
<td></td>
</tr>
<tr>
<td>Baseline risk (%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Increased risk (%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Total risk (%)</td>
<td>1.6</td>
</tr>
<tr>
<td>Anticoagulation after first 3 mo</td>
<td></td>
</tr>
<tr>
<td>Baseline risk (%/y)</td>
<td>0.3</td>
</tr>
<tr>
<td>Increased risk (%/y)</td>
<td>0.5</td>
</tr>
<tr>
<td>Total risk (%/y)</td>
<td>0.8</td>
</tr>
</tbody>
</table>
Superficial veins

Greater saphenous vein (GSV)

Lesser saphenous vein (LSV) (in back of calf; not shown on image)

Deep Veins

Inferior vena cava (IVC)
Common iliac vein
Internal iliac vein
External iliac vein
Common femoral vein
Deep femoral vein

Proximal veins

Femoral vein (formerly: Superficial femoral vein)
Popliteal vein
Gastrocnemius vein
Anterior tibial vein
Soleus vein
Peroneal vein
Posterior tibial vein

Distal veins
Duration of anticoagulation

- VTE due to transient risk factor
- Woman, DVT or PE, hormone-associated
- Woman, unprovoked DVT
- Woman, unprovoked PE

3 months

Long-term

Other considerations: Bleeding, fluctuating INRs, lifestyle impact, patient preference
Factors to consider:
1. Provoked or unprovoked
2. Risk of bleeding
3. Distal or proximal DVT*
4. Reversibility of risk factor
5. Deep or superficial

1. Provoked, first episode DVT
2. Provoked or unprovoked first episode but distal or upper extremity DVT
3. Unprovoked (PE or) proximal VTE (first or recurrent episode) but high risk of bleeding

Proximal DVT with low risk of bleeding; patient strongly prefers to stop anticoagulation

Unprovoked PE or proximal DVT with low risk of bleeding

Anticoagulate for at least 3 months, then risk stratify based on high-risk thrombophilia testing, scoring system such as DASH or HERDOO-2, d-dimer and repeat USG

1. Anticoagulate indefinitely
2. No routine thrombophilia evaluation

If low risk of VTE recurrence, may stop anticoagulation and start low-dose aspirin

If high risk of VTE recurrence, continue extended anticoagulation
3-month anticoagulation

1. Provoked VTE
2. Distal or upper extremity DVT
3. High risk of bleeding

Important to avoid interruption during first 3 months, particularly first month

VTE prophylaxis after 3 months if at risk
Extended anticoagulation

Unprovoked proximal DVT or PE

AND

Low risk of Bleeding
Unprovoked Proximal DVT: Wants to stop anticoagulation

After 3-months, risk-stratify especially in woman

DASH or HERDOO-2
D-dimer and ?repeat USG
High-risk thrombophilia

Low-dose aspirin if stop anticoagulation
Clinical scoring system

DASH:
- elevated D-dimer post anticoagulation
- age <50 years
- male sex
- hormone use in women

A score of 1: recurrence rate of 3.1% per year
Clinical scoring system

HERDOO-2:
- hyperpigmentation, edema or redness of affected leg,
- elevated D-dimer while on anticoagulation
- obesity with body mass index >30
- age 65 years or older.

Women with 1 risk factors: recurrence of 1.3% per year
Men: 9.9% or higher.
Case #2

77/M, prior history of 2 provoked DVTs, off A/C but on aspirin 325 mg. He developed an unprovoked PE more recently. He was started on rivaroxaban, and aspirin 325 mg was continued.

History of hypertension, CKD, issues with balance, left side hearing deficit, right knee arthritis, left leg weakness and has had multiple falls.
Case #2

Increased risk of bleeding

STOP aspirin

Management of comorbidities: PT for balance and gait training

Reassess the risk and benefit.
Choice of Anticoagulation
<table>
<thead>
<tr>
<th>Factor</th>
<th>Preferred Anticoagulant</th>
<th>Qualifying Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>LMWH</td>
<td>More so if: just diagnosed, extensive VTE, metastatic cancer, very symptomatic; vomiting; on cancer chemotherapy.</td>
</tr>
<tr>
<td>Parenteral therapy to be avoided</td>
<td>Rivaroxaban; apixaban</td>
<td>VKA, dabigatran, and edoxaban require initial parenteral therapy.</td>
</tr>
<tr>
<td>Once daily oral therapy preferred</td>
<td>Rivaroxaban; edoxaban; VKA</td>
<td></td>
</tr>
<tr>
<td>Liver disease and coagulopathy</td>
<td>LMWH</td>
<td>NOACs contraindicated if INR raised because of liver disease; VKA difficult to control and INR may not reflect antithrombotic effect.</td>
</tr>
<tr>
<td>Renal disease and creatinine clearance &lt;30 mL/min</td>
<td>VKA</td>
<td>NOACs and LMWH contraindicated with severe renal impairment. Dosing of NOACs with levels of renal impairment differ with the NOAC and among jurisdictions.</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>VKA, rivaroxaban, apixaban, edoxaban</td>
<td>Coronary artery events appear to occur more often with dabigatran than with VKA. This has not been seen with the other NOACs, and they have demonstrated efficacy for coronary artery disease. Antiplatelet therapy should be avoided if possible in patients on anticoagulants because of increased bleeding.</td>
</tr>
<tr>
<td>Dyspepsia or history of GI bleeding</td>
<td>VKA, apixaban</td>
<td>Dabigatran increased dyspepsia. Dabigatran, rivaroxaban, and edoxaban may be associated with more GI bleeding than VKA.</td>
</tr>
<tr>
<td>Poor compliance</td>
<td>VKA</td>
<td>INR monitoring can help to detect problems. However, some patients may be more compliant with a NOAC because it is less complex.</td>
</tr>
<tr>
<td>Thrombolytic therapy use</td>
<td>UFH infusion</td>
<td>Greater experience with its use in patients treated with thrombolytic therapy</td>
</tr>
<tr>
<td>Reversal agent needed</td>
<td>VKA, UFH</td>
<td></td>
</tr>
<tr>
<td>Pregnancy or pregnancy risk</td>
<td>LMWH</td>
<td>Potential for other agents to cross the placenta</td>
</tr>
<tr>
<td>Cost, coverage, licensing</td>
<td>Varies among regions and with individual circumstances</td>
<td></td>
</tr>
<tr>
<td>Agents</td>
<td>Situation</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>LMWH</td>
<td>Cancer, liver disease and coagulopathy, pregnancy</td>
<td></td>
</tr>
<tr>
<td>VKA</td>
<td>Creatinine clearance &lt;30 ml/min, poor compliance</td>
<td></td>
</tr>
<tr>
<td>Edoxaban, dabigatran</td>
<td>Require initial parental therapy</td>
<td></td>
</tr>
<tr>
<td>Dabigatran</td>
<td>Higher risk of CAD over VKA</td>
<td></td>
</tr>
<tr>
<td>VKA, Apixaban</td>
<td>History of GI bleeding*</td>
<td></td>
</tr>
</tbody>
</table>

*Dabigatran, rivaroxaban, and edoxaban may be associated with more GI bleeding than VKA.*
Major bleeding events comparing NOACs versus VKAs

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>TSOACs Events</th>
<th>Total</th>
<th>VKAs Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1 Major bleeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EINSTEIN-DVT, 2010</td>
<td>14</td>
<td>1718</td>
<td>20</td>
<td>1711</td>
<td>4.0%</td>
<td>0.70 [0.35, 1.38]</td>
<td></td>
</tr>
<tr>
<td>RE-MEDY, 2013</td>
<td>13</td>
<td>1430</td>
<td>25</td>
<td>1426</td>
<td>4.2%</td>
<td>0.52 [0.27, 1.01]</td>
<td></td>
</tr>
<tr>
<td>RE-COVER II, 2014</td>
<td>15</td>
<td>1279</td>
<td>22</td>
<td>1289</td>
<td>4.3%</td>
<td>0.69 [0.36, 1.32]</td>
<td></td>
</tr>
<tr>
<td>RE-COVER, 2009</td>
<td>20</td>
<td>1274</td>
<td>24</td>
<td>1265</td>
<td>5.0%</td>
<td>0.83 [0.46, 1.49]</td>
<td></td>
</tr>
<tr>
<td>AMPLIFY, 2013</td>
<td>15</td>
<td>2876</td>
<td>49</td>
<td>2689</td>
<td>5.1%</td>
<td>0.31 [0.17, 0.55]</td>
<td></td>
</tr>
<tr>
<td>J-ROCKET AF, 2012</td>
<td>26</td>
<td>639</td>
<td>30</td>
<td>639</td>
<td>5.9%</td>
<td>0.87 [0.52, 1.45]</td>
<td></td>
</tr>
<tr>
<td>EINSTEIN-PE, 2012</td>
<td>26</td>
<td>2412</td>
<td>52</td>
<td>2405</td>
<td>6.6%</td>
<td>0.50 [0.31, 0.80]</td>
<td></td>
</tr>
<tr>
<td>HOKUSAI-VTE, 2013</td>
<td>56</td>
<td>4118</td>
<td>66</td>
<td>4122</td>
<td>8.8%</td>
<td>0.85 [0.60, 1.21]</td>
<td></td>
</tr>
<tr>
<td>ARISTOTLE, 2011</td>
<td>327</td>
<td>9088</td>
<td>462</td>
<td>9052</td>
<td>13.8%</td>
<td>0.70 [0.61, 0.81]</td>
<td></td>
</tr>
<tr>
<td>ROCKET AF, 2011</td>
<td>395</td>
<td>7111</td>
<td>386</td>
<td>7125</td>
<td>13.8%</td>
<td>1.03 [0.89, 1.18]</td>
<td></td>
</tr>
<tr>
<td>RE-LY, 2009</td>
<td>741</td>
<td>12091</td>
<td>421</td>
<td>6022</td>
<td>14.2%</td>
<td>0.88 [0.78, 0.98]</td>
<td></td>
</tr>
<tr>
<td>ENGAGE-AF-TIMI-48, 2013</td>
<td>672</td>
<td>14014</td>
<td>524</td>
<td>7012</td>
<td>14.3%</td>
<td>0.64 [0.57, 0.72]</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>57850</strong></td>
<td></td>
<td><strong>44757</strong></td>
<td></td>
<td><strong>100.0%</strong></td>
<td><strong>0.72 [0.62, 0.85]</strong></td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>2320</td>
<td></td>
<td>2081</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.04; Chi² = 48.96, df = 11 (P < 0.00001); I² = 78%
Test for overall effect: Z = 3.98 (P < 0.0001)

**Total (95% CI)**

<table>
<thead>
<tr>
<th></th>
<th><strong>57850</strong></th>
<th></th>
<th><strong>44757</strong></th>
<th></th>
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<td>Total events</td>
<td>2320</td>
<td></td>
<td>2081</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.04; Chi² = 48.96, df = 11 (P < 0.00001); I² = 78%
Test for overall effect: Z = 3.98 (P < 0.0001)
Test for subgroup differences: Not applicable
Fatal bleeding events comparing NOACs versus VKAs

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>TSOACs Events</th>
<th>TSOACs Total</th>
<th>VKAs Events</th>
<th>VKAs Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE-MEDY, 2013</td>
<td>0</td>
<td>1430</td>
<td>1</td>
<td>1426</td>
<td>0.4%</td>
<td>0.33 [0.01, 8.15]</td>
<td></td>
</tr>
<tr>
<td>RE-COVER II, 2014</td>
<td>0</td>
<td>1279</td>
<td>1</td>
<td>1289</td>
<td>0.4%</td>
<td>0.34 [0.01, 8.24]</td>
<td></td>
</tr>
<tr>
<td>RE-COVER, 2009</td>
<td>1</td>
<td>1274</td>
<td>1</td>
<td>1265</td>
<td>0.5%</td>
<td>0.99 [0.06, 15.86]</td>
<td></td>
</tr>
<tr>
<td>AMPLIFY, 2013</td>
<td>1</td>
<td>2676</td>
<td>2</td>
<td>2689</td>
<td>0.7%</td>
<td>0.50 [0.05, 5.54]</td>
<td></td>
</tr>
<tr>
<td>J-ROCKET AF, 2012</td>
<td>1</td>
<td>639</td>
<td>3</td>
<td>639</td>
<td>0.8%</td>
<td>0.33 [0.03, 3.20]</td>
<td></td>
</tr>
<tr>
<td>EINSTEIN-DVT, 2010</td>
<td>1</td>
<td>1718</td>
<td>5</td>
<td>1711</td>
<td>0.9%</td>
<td>0.20 [0.02, 1.70]</td>
<td></td>
</tr>
<tr>
<td>EINSTEIN-PE, 2012</td>
<td>2</td>
<td>2412</td>
<td>3</td>
<td>2405</td>
<td>1.3%</td>
<td>0.66 [0.11, 3.97]</td>
<td></td>
</tr>
<tr>
<td>HOKUSAI-VTE, 2013</td>
<td>2</td>
<td>4118</td>
<td>10</td>
<td>4122</td>
<td>1.7%</td>
<td>0.20 [0.04, 0.91]</td>
<td></td>
</tr>
<tr>
<td>ROCKET AF, 2011</td>
<td>27</td>
<td>7111</td>
<td>55</td>
<td>7125</td>
<td>19.0%</td>
<td>0.49 [0.31, 0.78]</td>
<td></td>
</tr>
<tr>
<td>ARISTOTLE, 2011</td>
<td>34</td>
<td>9088</td>
<td>55</td>
<td>9052</td>
<td>22.0%</td>
<td>0.62 [0.40, 0.94]</td>
<td></td>
</tr>
<tr>
<td>RE-LY, 2009</td>
<td>51</td>
<td>12091</td>
<td>39</td>
<td>6022</td>
<td>23.1%</td>
<td>0.65 [0.43, 0.99]</td>
<td></td>
</tr>
<tr>
<td>ENGAGE-AF-TIMI-48, 2013</td>
<td>53</td>
<td>14014</td>
<td>59</td>
<td>7012</td>
<td>29.3%</td>
<td>0.45 [0.31, 0.65]</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>57850</strong></td>
<td><strong>44757</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>53497</strong></td>
<td></td>
<td><strong>0.53 [0.43, 0.64]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 173 vs. 234

Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 5.25$, df = 11 (P = 0.92); $I^2 = 0$

Test for overall effect: $Z = 6.30$ (P < 0.00001)
Intracranial bleeding comparing NOACs versus VKAs

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>TSOACs Events</th>
<th>Total Events</th>
<th>VKA Events</th>
<th>Total Events</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE-COVER, 2009</td>
<td>0</td>
<td>1274</td>
<td>3</td>
<td>1265</td>
<td>0.3%</td>
<td>0.14 [0.01, 2.74]</td>
</tr>
<tr>
<td>EINSTEIN-DVT, 2010</td>
<td>2</td>
<td>1718</td>
<td>2</td>
<td>1711</td>
<td>0.6%</td>
<td>1.00 [0.14, 7.06]</td>
</tr>
<tr>
<td>RE-COVER II, 2014</td>
<td>2</td>
<td>1279</td>
<td>2</td>
<td>1289</td>
<td>0.6%</td>
<td>1.01 [0.14, 7.14]</td>
</tr>
<tr>
<td>RE-MEDY, 2013</td>
<td>2</td>
<td>1430</td>
<td>4</td>
<td>1426</td>
<td>0.8%</td>
<td>0.50 [0.09, 2.72]</td>
</tr>
<tr>
<td>AMPLIFY, 2013</td>
<td>3</td>
<td>2676</td>
<td>6</td>
<td>2689</td>
<td>1.2%</td>
<td>0.50 [0.13, 2.01]</td>
</tr>
<tr>
<td>EINSTEIN-PE, 2012</td>
<td>3</td>
<td>2412</td>
<td>12</td>
<td>2405</td>
<td>1.4%</td>
<td>0.25 [0.07, 0.88]</td>
</tr>
<tr>
<td>J-ROCKET AF, 2012</td>
<td>5</td>
<td>639</td>
<td>10</td>
<td>639</td>
<td>2.0%</td>
<td>0.50 [0.17, 1.45]</td>
</tr>
<tr>
<td>HOKUSAI-VTE, 2013</td>
<td>5</td>
<td>4118</td>
<td>18</td>
<td>4122</td>
<td>2.3%</td>
<td>0.28 [0.10, 0.75]</td>
</tr>
<tr>
<td>ROCKET AF, 2011</td>
<td>55</td>
<td>7111</td>
<td>84</td>
<td>7125</td>
<td>18.6%</td>
<td>0.66 [0.47, 0.92]</td>
</tr>
<tr>
<td>ARISTOTLE, 2011</td>
<td>52</td>
<td>9088</td>
<td>122</td>
<td>9052</td>
<td>20.3%</td>
<td>0.42 [0.31, 0.59]</td>
</tr>
<tr>
<td>RE-LY, 2009</td>
<td>66</td>
<td>12091</td>
<td>90</td>
<td>6022</td>
<td>21.1%</td>
<td>0.37 [0.27, 0.50]</td>
</tr>
<tr>
<td>ENGAGE-AF-TIMI-48, 2013</td>
<td>102</td>
<td>14014</td>
<td>132</td>
<td>7012</td>
<td>31.0%</td>
<td>0.39 [0.36, 0.50]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>57850</td>
<td>44757</td>
<td>100.0%</td>
<td></td>
<td></td>
<td>0.43 [0.37, 0.50]</td>
</tr>
</tbody>
</table>

Total events: 297 VS 485

Heterogeneity: Tau² = 0.00; Chi² = 11.26, df = 11 (P = 0.42); I² = 2%

Test for overall effect: Z = 10.95 (P < 0.00001)
# VKA versus NOACs

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Warfarin</th>
<th>NOACs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset/Duration</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Bridging</td>
<td>Needed</td>
<td>No for api/rivaroxaban</td>
</tr>
<tr>
<td>Interactions</td>
<td>Significant</td>
<td>Limited</td>
</tr>
<tr>
<td>Monitoring</td>
<td>INR</td>
<td>None</td>
</tr>
<tr>
<td>Reversal Agents</td>
<td>Yes</td>
<td>Yes/approval pending</td>
</tr>
<tr>
<td>VTE recurrence</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Higher</td>
<td>Lower</td>
</tr>
<tr>
<td>Cost</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

Route oral, once or twice daily doses
Reversal of new anticoagulants

• Hold 1-2 days before procedure
• SUPPORTIVE CARE

• Oral factor Xa inhibitors (rivaroxaban, apixaban, edoxaban): Andexanet alfa

• Dabigatran: Idarucizumab
Thrombophilia testing
Thrombophilia evaluation

- Performed after careful consideration
- Right timing
- Right patient
- Right tests
Don’t test for thrombophilia in adult patients with venous thromboembolism (VTE) occurring in the setting of major transient risk factors (surgery, trauma or prolonged immobility).

- Thrombophilia can result in harm if the duration of anticoagulation is inappropriately prolonged, if a patient is inappropriately labeled as thrombophilic, or if negative testing is misinterpreted to suggest a patient does not have a risk of recurrent thrombosis.
- Testing is expensive ($500 - $1300 and up)
- For a VTE occurring in the setting of major, transient risk factors, the results of thrombophilia testing should not impact anticoagulant management
Thrombophilia is not associated with Risk of VTE Recurrence

N = 474
HR = 1.3 (95% CI, 0.8 – 2.0)

Christiansen et al. JAMA 2005;293(19):2353-2361
Thrombophilic Defects Are Not Associated with a Higher Risk of Recurrent VTE

Kearon C et al. Blood 2008;112:4432-4436
Reported Predictors of VTE Recurrence

- Prior history of thrombosis
- Increasing patient age at incident VTE
- Male sex
- Idiopathic incident VTE
- Incident VTE associated with active cancer

Presence of > 1 inherited thrombophilias is not a predictor of VTE recurrence

“Unexplained” arterial thromboembolism

Even lower value of thrombophilia testing

?Therapeutic implications
Thrombophilia evaluation

Antithrombin activity
Protein C activity
Free protein S antigen and activity
Antiphospholipid syndrome- acquired

PNH and MDS: alter management
Thrombophilia evaluation

Heparin-induced thrombocytopenia
Disseminated intravascular coagulation
Thrombotic microangiopathy
Catastrophic antiphospholipid antibody syndrome
Cancer screening

Unprovoked VTE may be the first sign of an occult cancer.

Extensive screening with imaging and tumor markers is not of benefit.

Age and sex appropriate screening
IVC filter
3. Don't use inferior vena cava (IVC) filters routinely in patients with acute VTE.

- IVC filters can harm patients, they are costly, and there use is not well supported by evidence.
IVC filter

Decreases the risk of PE modestly
Increases the risk of lower extremity DVT
Filter-related complications such as migration.

Indication:

- **Acute, Proximal AND Lower extremity DVT**
- Cannot tolerate anticoagulation.
Home or early discharge

(1) clinically stable with good cardiopulmonary reserve
(2) no contraindications for anticoagulation
(3) expected to be compliant and
(4) feels well enough

Right ventricular dysfunction or increased cardiac biomarker levels: Hospitalization

(Grade 2B ACCP 2016 recommendations)
Thrombolysis

ACCP: anticoagulant alone over thrombolysis or catheter-assisted thrombus removal

Thrombolysis: low risk of bleeding and PE associated with hypotension.
Superficial vein thromboses

Superficial vein thromboses:
- 5 cm or more
- close to deep veins, or
- underlying diseases such as cancer

Fondaparinux 2.5 mg for 6 weeks: FDA approved
PICC associated DVT

PICC does not need to be removed

3 months or more

Cancer-related thromboses: extended anticoagulant therapy
Conclusion

• Provoked VTE or high-risk of bleeding: A/C for 3 months

• Unprovoked VTE, and low risk of bleeding: indefinite A/C

• Risk stratification for unprovoked DVT who want to stop

• NOACs vs. VKA: Lower risk of bleeding
Conclusion

Limited role of thrombophilia testing or extensive cancer screening

Limited role of IVC filter