COVID-19, Clots and Anticoagulants: A Case-based Discussion on VTE Prevention and Treatment
Speakers

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Case

- 49 yo man admitted after 5 days of fever, progressive SOB

- PMH: obesity (BMI 38), DM2 on insulin, and mild CKD (stage 2)

- ED: HR 98, SBP 134/88, RR 24, SpO2 84% on RA → 94% on 2L

- No leg swelling

- D-dimer 8.4 (nl<0.50)

- CXR: Bilateral patchy infiltrates

- PECT: no PE, bilateral ground glass opacities and consolidation (RLL, LUL)

- Admit to the general medicine wards
Discussion

• What contributes to VTE risk?
• On what type of unit should this patient be managed and why?
D-dimer and COVID-19 Mortality

Overall Mortality - China

Day after admission

Non-survivors

Survivors

D-dimer and PE - France

<table>
<thead>
<tr>
<th>D-dimer and PE - France</th>
<th>PE Present (n=32)</th>
<th>PE Absent (n=74)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated D-dimer (&gt;0.5)</td>
<td>28 (88%)</td>
<td>50 (68%)</td>
<td></td>
</tr>
<tr>
<td>Median (IQR)</td>
<td>15.4 ± 14.4</td>
<td>1.9 ± 3.1</td>
<td>0.001</td>
</tr>
<tr>
<td>&lt;5</td>
<td>5 (18%)</td>
<td>39 (78%)</td>
<td></td>
</tr>
<tr>
<td>5-20</td>
<td>12 (43%)</td>
<td>9 (18%)</td>
<td></td>
</tr>
<tr>
<td>&gt;20</td>
<td>11 (39%)</td>
<td>2 (4%)</td>
<td></td>
</tr>
</tbody>
</table>

Tang N et al JTH 2020;18:844-847

Leonard-Lorant I et al Radiology 2020 ePub Apr 24
# D-dimer and COVID-19 Mortality

## VTE Risk Factors - Netherlands

<table>
<thead>
<tr>
<th></th>
<th>VTE (n=39)</th>
<th>No VTE (n=159)</th>
<th>HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD)</td>
<td>62 (10)</td>
<td>60 (15)</td>
<td>1.05 (0.82-1.4)</td>
</tr>
<tr>
<td>ICU</td>
<td>35 (89%)</td>
<td>40 (25%)</td>
<td>8.9 (3.2-25)</td>
</tr>
<tr>
<td>Median D-dimer (IQR)</td>
<td>2.6 (1.1-18)</td>
<td>1.0 (0.7-1.7)</td>
<td>1.4 (1.1-1.9)</td>
</tr>
</tbody>
</table>

Cumulative Incidence of VTE

Middledorp S et al JTH 2020 ePUb May 6
Mechanism of COVID-19 Thrombosis
Discussion

• What VTE prophylaxis would you use?
What dose of anticoagulation?

HR 0.86 (0.82-0.89)

- NYC Hospital System
- 2733 hospitalized patients with COVID-19
- Compare in-hospital treatment-dose anticoag vs. none

DOI: 10.1016/j.jacc.2020.05.001
Benefit of Therapeutic Anticoagulation?

- Same NYC Hospital System
- 3772 hospitalized patients with COVID-19
- Compare pre-hospital anticoag vs. no anticoag

Tremblay D et al Blood 2020 ePub May 27, DOI: 10.1182/blood.2020006941
## What dose of anticoagulation?

<table>
<thead>
<tr>
<th>Patient with COVID-19</th>
<th>Standard Dose VTE Prophylaxis</th>
<th>Intermediate or Escalated Dose VTE Prophylaxis</th>
<th>Therapeutic Anticoagulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatients</td>
<td>Consider if high-risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor patients</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU Patients</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>ARDS Patients</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Confirmed VTE</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Suspected PE</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

**How best to address bleeding risk?**
Case

• On hospital day 4, his O2 requirement rapidly increases to 6L
• He is transferred to ICU for heated high-flow O2
• He develops acute on chronic renal insufficiency
  • Cr 2.2, CrCl <30ml/min

• Do you change his VTE prophylaxis regimen?
Case

- After 3 days in the ICU, his O2 requirements improve, no longer febrile
  - He transfers to the floor for continued O2 weaning
  - Renal function improving (Cr 1.7)

- He is eventually discharged home on hospital day 10 (symptom day 15)
  - Still requiring 0.5-1L NC
  - Back to baseline renal function (Cr 1.3)
  - D-dimer 2.5 (nl <0.5)

- Do you consider post-hospital VTE prophylaxis?
Risk of post-hospital VTE

<table>
<thead>
<tr>
<th>medication</th>
<th>VTE Events</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rivaroxaban 10mg daily</td>
<td>4.4%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Enoxaparin 40mg daily</td>
<td>5.7%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Betrixaban 80mg daily</td>
<td>5.3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Enoxaparin 40mg daily</td>
<td>7.0%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

DOI 10.1002/jhm.1002
NEJM 2013;368:513-523
NEJM 2016;375:534-544
Case – What if?

• Upon admission to ICU, DVT scan performed
  • Acute DVT in left iliofemoral vein
• Reminder: Cr 2.2, CrCl <30ml/min

• What anticoagulation regimen?
• How long to treat?
Take-home Points

• Key risk factors for VTE include COVID-19
• Stick to evidence-based prophylaxis unless in a clinical trial
  • Consider intermediate-dose or escalated prophylaxis for sicker patients
• Consider role of post-hospital VTE prophylaxis
  • Persistent immobilization
  • Ongoing inflammation
  • Prior VTE
• Confirmed of presumed VTE → 3 months of anticoagulation