Acute pulmonary embolism: a challenging management decision

C. Kupatt
Medizinische Klinik und Poliklinik I
Klinikum Großhadern
Munich, Germany

Nothing to disclose
Case C.K., 26yrs.

- Weight gain in the last 6 wks
- Face, neck swelling
- Venous pulsation of the neck
- Previous diagnosis: thyroid enlargement
Diagnostic Measures

- After 5 wks: Diagnosis of NH-lymphoma mediastinal,
- Encircling of VCS
- Echo: prominent right ventricle
CT Scan
Risk assessment
acute pulmonary embolism

<table>
<thead>
<tr>
<th>PE-related early MORTALITY RISK</th>
<th>RISK MARKERS</th>
<th>Potential treatment implications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CLINICAL (shock or hypotension)</td>
<td>RV dysfunction</td>
</tr>
<tr>
<td>HIGH &gt;15%</td>
<td>+</td>
<td>(+)(^a)</td>
</tr>
<tr>
<td>NON HIGH Intermediate 3–15%</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>Low &lt;1%</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

ESC Guidelines 2008
Suspected high-risk PE
i.e. with shock or hypotension

CT immediately available*

no

yes

Echocardiography

RV overload

no

yes

No other tests available# or patient unstable

Search for other causes
Thrombolysis/embolectomy not justified

PE-specific treatment justified
Consider thrombolysis or embolectomy

CT available and patient stabilized

CT

positive

Search for other causes
Thrombolysis/embolectomy not justified

negative

ESC Guidelines 2008
Suspected non-high-risk PE
i.e. without shock or hypotension

Assess clinical probability of PE
Implicit or prediction rule

Low/intermediate clinical probability
or "PE unlikely"

- D-dimer
  - negative
    - No treatment*
  - positive
    - Multidetector CT
      - No PE
        - No treatment*
      - PE†
        - Treatment*

High clinical probability
or "PE likely"

- Multidetector CT
  - No PE
    - No treatment* or investigate further#
  - PE
    - Treatment*
Treatment APE

- Intermediate risk (3-15%)
  - NMH, Fondaparinux
- High bleeding risk UFH (pTT-elevation)
- Selected patients: thrombolysis
Peitho-Studie

- multicenter randomised prospective study
- Tenecteplase vs. UFH
- Acute right ventricular dilation (TnI +), no hypotension
- 1000 patients,

- Principal investigators: Stavros Konstantinides, Guy Meyer
Outcome C.K.

- Study medication, no improvement for 6h
- Positive shock-index
- Rescue Lysis (Tenecteplase)
Co-treatment Thrombolysis

- Heparin (UFH > LMH)
- No coumarin
- no GPIIB/IIIA-antagonist
Case: A.L., 60yrs

Sudden worsening of health
- dyspnea (exercise)
- retrosternal pain

At hospital admission
- ECG: no STEMI
- Dynamic Q in III
- D-Dimer: 2.9 µg/ml,
- TnI 2.94 ng/ml
- CK: 307 U/l, MB: 62 U/l
Diagnostic echo
CT Scan

- Pulmonary embolism
CT Scan
Troponin-Erhöhung (non-ACS)

- Aortendissecation
- LV-Hypertrophy (auch: aortic stenosis)
- Tachykardia (e.g. AF)
- Chron. Heart failure (ischemic, non-ischemic, toxic - chemo)
- Mechanical (ICD, Ablation, heart surgery, Trauma)
- inflammatory (Endo-, Myo-, Percarditis, HTx)
### Table 1  Age, cTnI Value, and Its Sensitivity in Each Group of Patients in ER

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (years)</th>
<th>cTnI (ng/ml)</th>
<th>Sensitivity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI (n=74)</td>
<td>68.6±1.46, h, j, k</td>
<td>8.48±2.64b, c, d, e, f, g, i, j, k</td>
<td>94.6</td>
</tr>
<tr>
<td>UAP (n=48)</td>
<td>65.9±1.46, h, j</td>
<td>0.25±0.07</td>
<td>77.1</td>
</tr>
<tr>
<td>SAP (n=11)</td>
<td>67.0±3.9h, j</td>
<td>0.04±0.01</td>
<td>63.6</td>
</tr>
<tr>
<td>HF (n=79)</td>
<td>75.3±1.7a, h, e, g, h, i, j, k</td>
<td>1.32±0.36</td>
<td>89.9</td>
</tr>
<tr>
<td>HF + RF (n=27)</td>
<td>65.9±2.7h, j</td>
<td>0.97±0.39</td>
<td>88.9</td>
</tr>
<tr>
<td>RF (n=13)</td>
<td>78.2±2.7a, b, e, g, h, i, j, k</td>
<td>0.06±0.01</td>
<td>84.6</td>
</tr>
<tr>
<td>CM (n=13)</td>
<td>56.1±7.6</td>
<td>1.74±1.02</td>
<td>76.9</td>
</tr>
<tr>
<td>MC (n=5)</td>
<td>47.0±14.8</td>
<td>2.27±1.09</td>
<td>80.0</td>
</tr>
<tr>
<td>PAF (n=23)</td>
<td>64.6±1.9h</td>
<td>0.15±0.08</td>
<td>60.9</td>
</tr>
<tr>
<td>PSVT (n=8)</td>
<td>53.5±7.4</td>
<td>0.13±0.06</td>
<td>87.5</td>
</tr>
<tr>
<td>PE (n=10)</td>
<td>57.5±5.4</td>
<td>0.35±0.27</td>
<td>70.0</td>
</tr>
</tbody>
</table>
Akuter Thoraxschmerz (ESC Guidelines 2007)

Admission

Diagnostic measures

STEMI

Angina

ECG

ACS?

Response to antianginal treatment

Biochemistry troponin

ECG

Echocardiogram

Calculated risk score (GRACE)

Risk criteria

Optional: CT, MRI, scintigraphy

Urgent <120min

Early (<24h)

<72h

no/elective

alternative diagnosis

Eur H Journal 2007
Troponin I & AMI

Keller-T et al., NEJM 2009
and aortic-valve disease. However, as in other studies, our data provide persuasive evidence that rising troponin I values as measured with sensitive assays, a pattern that reliably establishes the diagnosis of myocardial infarction, can be predicted with a high degree of diagnostic accu-

Keller-T et al., NEJM 2009

TnI 2.94 $\rightarrow$ 23.4 ng/ml
PCI H.L.
Summary: APE & ACS

- LE (submassive)
- ACS (TnI +)
- Massive LE
- ACS
- Submassive LE
- STEMI
- PCI
- Anticoagulation
- Antiaggregation
- Stabilisation
- Thrombolysis
- Stabilisation strategy (72h)
- Thrombolysis
- PCI
Thanks!

- Medizinische Klinik I
  - Dr. Martin Greif
  - Dr. Rainer Baumgartner
  - Prof. Dr. J. Behr

- Institut für Radiologie
  - PD Dr. Bernd Wintersperger
  - PD Dr. Konstantin Nikolaou
  - Prof. Dr. Maximilian Reiser