A HEART IN TROUBLE

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Case presentation

- 19 year old morbidly obese male with no prior PMHx was admitted to an outside hospital for syncope
- In the hospital: 2 additional episodes of unresponsiveness requiring CPR → polymorphic ventricular tachycardia (Torsade de pointes) → ROSC following defibrillation
- Upon transfer, he denied dyspnea or chest pain
- Physical exam:
  - BP 122/63 T 36.7°C RR 20 SpO2 99% Wt 341 lb. (BMI 45.08 kg/m²)
  - General: morbidly obese
  - Cardiopulmonary exam: normal S1, pronounced S2, no additional heart sounds. Lungs were clear
- Labs:
  - Normal electrolytes, renal function
  - Tn: 0.16 (0.00-0.05 ng/mL)
- EKG: TWI’s in the anterior precordial leads. QTc 643ms
Hospital Course

- **Transthoracic echocardiogram (TTE)**
  - Biventricular failure with EF 40%
  - Diffuse hypokinesis of the LV
  - Moderate RV dysfunction, moderate tricuspid regurgitation
  - Pulmonary hypertension (PA peak 36 mmHg)

- **Left and right cardiac catheterization**
  - Clean coronaries
  - Elevated right-sided filling pressures and pulmonary hypertension (PAP of 66 mmHg/16 mmHg, mean 37 mmHg)
  - Normal left-sided filling pressures
  - Decreased cardiac output (3.7 L/min), cardiac index (1.4 L/min/m²)

- **Repeat TTE, performed 2 days later**
  - LV systolic function down to EF of 35%
  - RV and RA markedly dilated with systolic function severely reduced
  - New septal flattening
  - Persistent moderate tricuspid regurgitation
  - Worsened pulmonary hypertension (PA peak 59 mmHg)
CTA
Hospital Course, continued

- Systemic lytic therapy with IV Alteplase
- Heparin gtt as bridge to therapeutic warfarin therapy
- Duplex US of the lower extremities confirmed acute DVT of the L lower extremity, extending from the common femoral bifurcation throughout the deep veins of the leg + free-floating thrombus at the level of the bifurcation
- Inferior Vena Cava filter placed due to the large residual thrombus
- Repeat TTE just prior to discharge
  - LV systolic function improved, EF 55%
  - RV size decreased with systolic function now only mild to moderately reduced
  - PA peak pressure down to 40mmHg
- Patient discharged home on warfarin
Diagnosing PE

- Acute PE can occur rapidly and unpredictably and may be difficult to diagnose.
- This patient’s clinical probability of having a PE based on clinical-prediction scores (Wells and Geneva) was LOW.
- Massive PE should be considered in patients with sudden onset syncope, hypotension, hypoxia, electromechanical dissociation or cardiac arrest\(^1\).

Obesity and VTE

• Obesity is a risk factor for VTE
  • Prevalence of DVT/PE in hospitalized patients is higher in obese patients than in non-obese (RR=2.03-2.50)\(^1,2\)
    • RR was highest among obese patients aged 11-20 years (RR=5.80)\(^1\)
  • Morbid obesity is associated with delayed diagnosis of PE\(^3\)

## How long to anti-coagulate?

<table>
<thead>
<tr>
<th>Indication</th>
<th>9th ACCP guidelines</th>
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<tbody>
<tr>
<td>First episode of VTE secondary to a transient risk factor*</td>
<td>3 months (Grade 1B)</td>
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<tr>
<td>First episode of idiopathic (unprovoked) VTE</td>
<td>At least 3 months (Grade 1B)</td>
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|                                                      | After 3 months, evaluate risk-benefit ratio of long-term treatment (Grade 1B)  
|                                                      | If favorable, long-term treatment                        |
| Other (recurrent, active malignancy)                 | Long-term                                               |

*pregnancy or recent delivery in the last 3 mo., leg trauma, fracture, surgery in last 3 mo., or immobilization due to a chronic medical illness
Balancing risk/benefit

- **Risk of recurrent VTE**
  - <1% per year while patients are receiving anticoagulant therapy, but 2-10% per year after the discontinuation of such therapy and as high as 40% at 10 years\(^1\)
  - Risk is higher in idiopathic events, male subjects, patients with persistently elevated D-dimer level, and during the first two years after discontinuation of treatment\(^2\)

- **Risk of bleeding**
  - Annual risk of major bleeding on anticoagulant treatment varies largely in observational studies with figures of 2% to 29%, depending on the patient characteristics\(^2,3\)
  - Risk factors for bleeding: age >65, previous bleeding or stroke, cancer, renal or liver failure, anemia and thrombocytopenia, diabetes, falls, EtOH abuse\(^3,4\)

Back to our patient

• 3 month follow-up:
  • TTE showed normalization of R heart function and pulmonary pressures
  • Extensive hyper-coagulable workup was negative
  • IVC filter was removed
  • Because of his idiopathic VTE (HIGH risk of recurrence) and favorable benefit-risk ratio, LIFELONG anticoagulation was recommended
Summary

• PE can occur without classic symptoms and defy clinical prediction models, and should be considered in cases of syncope or electromechanical dissociation
• Obesity is a risk factor for VTE
• Duration of anticoagulation depends on risk of recurrence and risk of bleeding, but indefinite/lifelong treatment is favored for idiopathic events
References

- Agnelli G and Becattini, C. Acute pulmonary embolism. NEJM 2010; 363: 266-274.
- Tapson, V. Acute pulmonary embolism. NEJM 2008; 358: 1037-1052.
V/Q scan
Acute management of PE

Hemodynamically unstable
- Proceed to thrombolysis, surgery, or catheter embolectomy

Hemodynamically stable
- Evaluate clinical and cardiac features
  - Assess for right ventricular dysfunction
  - Echocardiography
  - Multidetector CT
  - Assess for right ventricular injury
  - Troponin

No dysfunction or injury
- Continue anticoagulation and consider admission and early discharge or home treatment

Dysfunction
- Continue anticoagulation
- Medical ward admission

Dysfunction and injury
- Consider ICU admission or thrombolysis in patients at low risk for bleeding

NEJM, 2010
The role of emerging therapeutics

• New oral anticoagulants
  • Rivaroxaban (direct factor Xa inhibitor)*
  • Apixaban (direct factor Xa inhibitor)
  • Dabigatran (direct thrombin inhibitor)

• Advantages
  • Potential for lower bleeding rates
  • Easier administration and less frequent monitoring
  • Similar efficacy

• Remaining questions and concerns:
  • Direct comparison is lacking (RE-MEDY trial, NEJM 2013)
  • Acute coronary syndromes rate increase with dabigatran (Archives 2012)
  • Antidotes?
  • Cost