Acute dyspnea: how to disentangle COPD & Acute Heart Failure

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Disclosures

• **Swiss National Science Foundation**

• [Logo: University Hospital Basel]

• Research support / travel support / consulting fees from several diagnostic and pharmaceutical companies
• 76y, male, **acute dyspnea, since 24h** + coughing, sputum↑
  Previously: Exertional dyspnea, never at rest

• **PH:** CAD, CABG, persistent Afib, VVIR-PM, COPD, Chronic lymph edema (regular drainage)

[Image]

**Vitals:**
RR 26, Temp 38,5°C, Puls 60, BP 120/80, Oxy 94%

• **Physical:**
  - Tachypnea, no rales, **Exspirium↑**, Wheezing
  - Neck veins +/-, mild ankle edema (preexisting)
  - barely hearable HS, no 3. HS

**HF:** yes/no
Ruhe EKG

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<tr>
<th>Geb</th>
<th>20.05.1928</th>
<th>HF: 70 /min</th>
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<tbody>
<tr>
<td>Alter</td>
<td>78 J</td>
<td>BD: 0/0 mmHg</td>
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<tr>
<td>Geschl</td>
<td>männlich</td>
<td>Intervalle</td>
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<tr>
<td>Grösse</td>
<td>0 cm</td>
<td>RR: 855 ms</td>
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<tr>
<td>Gewicht</td>
<td>0 kg</td>
<td>P: 96 ms</td>
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<tr>
<td>Zimmer</td>
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<td>PQ: 156 ms</td>
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Validiert: KSB Klinikum II/Notfall
Benutzer: Notfallstation 2

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Lab:

BNP 2‘100 pg/ml (n<50)

HF: yes/no
What is the key symptom in HF?
Dyspnea

Pathophysiology?
Intracardiac filling pressures $\uparrow$

What are the key diagnostic tools?
Symptoms & signs
ECG, Chest x-ray, BNP
Echo

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Upon presentation a measurement of plasma natriuretic peptide level (BNP, NT-proBNP or MR-proANP) is recommended in all patients with acute dyspnoea and suspected AHF to help in the differentiation of AHF from non-cardiac causes of acute dyspnoea.
NP: Quantitative Marker of HF

Volume ↑
Pressure ↑

ANP

Suppression of renin–angiotensin and endothelin

Decreased peripheral vascular resistance (decreased blood pressure)

Increased natriuresis

CNP

LV Syst. Dysfunction +
LV Diast. Dysfunction +
Valvul. Dysfunction +
RV Dysfunction

BNP =

1) Diagnosis
2) Disease Severity

Interpretation of BNP in Acute Dyspnea

1) **Quantitative Variable**

2) **Always** conjunction with clinical information

- **<100pg/ml**
  - No HF

- **100-400pg/ml**
  - Additional information
  - No HF

- **>400pg/ml**
  - HF
  - Diuretics
  - Nitrates
  - ACE-I

*Cave: a) GFR < 60ml/min
b) Obesity

**Interpretation of NT-proBNP in dyspnea**

1) **Quantitative variable**

2) **Always** conjunction with clinical information

- **<300pg/ml**
  - No HF

- **300-450 pg/ml**
  - 300-900 pg/ml
  - 300-1800 pg/ml

- **<50y: >450 pg/ml**
  - 50-75: >900 pg/ml
  - >75y: >1800 pg/ml

*Cave: a)Obesity

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Cut-off levels: The accuracy of NP can be increased by adjusting for:

1. Gender
2. Coronary artery diseases
3. Obesity
Obesity: does it matter?

Courtesy of Alan Maisel, M.D.
Obesity: Optimal cut-off levels to rule out HF

Common errors

Pulmonary disease is the most common cause of acute dyspnea

I am done once HF is diagnosed

HF can nearly always be reliably diagnosed clinically by a HF expert
1. Is it HF?
   History, physical, ECG
   Chest x-ray, BNP ✓

2. Cardiac disease?

3. Trigger?
1) Diagnose HF: Clinical + ECG + BNP

2) Echo

LVEF ↓ Valves isolated RV↓ LA↑

HFrEF VHD RV-HF HFpEF

HFmEF (LVEF 40-50%)

1) Diagnose HF: Clinical + ECG + BNP

2) Echo

- LVEF ↓
- Valves
- isolated RV ↓
- LA ↑

HFrEF  VHD  RV-HF  HFpEF

HFmEF (LVEF 40-50%)

1. Is it HF?  
*History, physical, ECG, Chest x-ray, BNP ✓*

2. Cardiac disease?

3. Trigger?
Biomarkers in HF: Diagnosis

1. Is it HF?
   History, physical, ECG
   Chest x-ray, BNP ✓

2. Cardiac disease?

3. Trigger?
   cTn, D-Dimers, CRP/PCT, Hb, TSH
   Ferritin, Transferrin saturation