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ACUTE DECOMPENSATED HEART FAILURE AND CARDIORENAL SYNDROME

AHMAD AL RIYAHİ
Objectives

- Introduce the patient and his relevant medical history
- Outline current guidelines for the treatment of heart failure (HF)
- Describe cardiorenal syndrome (CRS) and current management strategies for CRS (type1)
Patient information

HPI:
- DM is a 60 yo M who presents to the ED with increasing SOB on exertion or while lying down x 3 days
- No SOB at rest
- Bilateral leg edema (2+ pitting)
- No fever, chest pain, coughing, dizziness

CC:
- SOB and leg edema
Patient information

PMH
- HF (systolic dysfunction) with ischemic cardiomyopathy (1993), Stage C now, LVEF = 27%, was 30% Aug 2013
- NSTEMI-no stent (2013)
- Hypertension
- Atrial fibrillation: CHA2DS2-VASc = 3
- CKD
- Dyslipidemia
- GI bleeding (2013)
- Hx of poor compliance (Meds, refused AICD)
Patient information

- **PSH**
  - Hernia repair 2012

- **SH**
  - Hx of tobacco use
  - Hx of substance abuse (THC, cocaine)
  - EtOH: occasional

- **FH**
  - Mother died of MI at 82 years

- **Allergies:** NKDA
Patient information

**VS**
- BP = 123/84
- HR = 111
- RR = 16
- Temp = 37 °C
- SpO2 = 99%

**Ht:** 175 cm

**Wt:** 73 Kg

**Chest X-ray:**
- fluid overload
- Cardiomegaly

**EKG:** Unchanged

**Labs**
- Scr = 1
- BNP = 1000 \( \rightarrow \) 4600
- Troponin = 0.04 (unchanged)
- BUN = 18
- TSH = 3.01
- LFTs = WNL
- WBC = 9.8
- Hgb = 10.4
- K = 4.3
Patient information

- Home medications
  - Lisinopril 40mg daily
  - Metoprolol 100mg BID
  - Furosemide 40mg daily
  - Digoxin 125mcg daily
  - ASA 81mg daily
  - NTG 0.4mg SL prn
  - Atorvastatin 40mg daily
  - Famotidine 20mg BID
  - Refused warfarin
Patient information

- Inpatient medications
  - Furosemide 40mg BID IV
  - Cont rest of home meds

- Impression and plan
  - CHF exacerbation
  - No improvement overnight at ED → admitted
Treatment of HF

**Stage A:**
- Intervene early:
  - Manage risk factors:
    - HTN, DM, lipid disorders, obesity, tobacco use

**Stage B: Asymptomatic HF**
- ACEI/ARB
- Beta blockers (bisoprolol, carvedilol, metoprolol succinate)
- Implantable cardioverter defibrillator (ICD)
  - Class I indication for ischemic cardiomyopathy
  - Class IIb indication for non-ischemic

Yancy CW. J Am Coll Cardiol. 2013
Treatment of HF

- **Stage C: Symptomatic HF**
  - Similar to Stage B plus...
  - Aldosterone antagonist:
    - LVEF $\leq 35\%$, SCr $\leq 2.5$ in men or $\leq 2.0$ in women, $K < 5$ mEq/L
  - Hydralazine-isosorbide dinitrate
    - Added to standard therapy in African American patients
    - Other patients not on ACEI/ARB
  - Loop diuretics for fluid overload
  - Digoxin: reduces hospitalization
  - Anticoagulation (if pt has another RF for cardioembolic stroke)
  - Omega-3

- **Stage D: end-stage HF (symptomatic at rest)**
  - Chronic inotropes, device based therapy, transplantation
Is Mr. DM on target therapy?

- He's stage C
- He's on metoprolol and lisinopril
- He's not on aldosterone antagonist
- He's on digoxin and furosemide
- He refused AICD
- He refused anticoagulants
Mr. DM on day 3

- SOB not improved
- Leg edema (3+ pitting)
- SCr: 1.9 (was 1.0) \(\rightarrow\) acute on chronic kidney injury
  - Lisinopril on hold
- Resistant to diuretics (furosemide, bumetanide)

Acute decompensated HF (ADHF) + AKI

= Cardiorenal Syndrome (CRS) Type 1?

Ronco C. *Eur. Heart J.* 2010
Cardiorenal/Renocardiac Syndrome

Cardiorenal:
- Type 1: acute HF leads to acute kidney injury
- Type 2: chronic cardiac dysfunction leads to CKD

Renocardiac:
- Type 3: acute kidney injury leads to heart dysfunction
- Type 4: chronic kidney disease leads to heart dysfunction

- Type 5 (secondary CRS): systemic conditions leading to simultaneous injury and/or dysfunction of heart and kidney.

Ronco C. Eur Heart J. 2010
In CRS:

↑ Venous pressure
↑ Intra-abdominal pressure
↑ Renal venous congestion

Treatment of CRS (type 1)

- No consensus guidelines.
- "CRS: Report from the consensus conference of Acute Dialysis Quality Initiative", European Heart Journal
  - Loop diuretics (e.g. furosemide)
  - Vasodilators (e.g. nesiritide)
  - Inotropic drugs (e.g. dobutamine, dopamine): for congestion with low blood pressure
  - Ultrafiltration: for diuretic resistance

Ronco C. Eur Heart J. 2010
# Vasodilator: Nesiritide

<table>
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<tr>
<th>Trial</th>
<th>Population</th>
<th>Intervention</th>
<th>Results</th>
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<tbody>
<tr>
<td><strong>ASCEND-HF</strong></td>
<td>N=7141 Hospitalized with acute decompensated HF</td>
<td>- Assigned patients to placebo or nesiritide for 24 to 168 hours&lt;br&gt;- Dose: 2ug/kg bolus then 0.01ug/kg/min</td>
<td>- No change in risk of worsening renal function compared with placebo.&lt;br&gt;- No change in mortality risk&lt;br&gt;- No major harm</td>
</tr>
<tr>
<td>- O’Connor CM. NEJM 2011 - Randomized controlled trial</td>
<td>N = 17271</td>
<td></td>
<td>No change in mortality rates</td>
</tr>
<tr>
<td>- Yan B. Int J of Cardiol. 2014 - Systematic review and meta-analysis</td>
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# Inotropes

<table>
<thead>
<tr>
<th>Trial</th>
<th>Population</th>
<th>Intervention</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>ROSE AHF</td>
<td>$N = 360$</td>
<td>Randomized to receive: - placebo, - dopamine (low dose: 2ug/kg/min), - Nesiritide (low dose: 0.005 ug/kg/min)</td>
<td>- No improvement of renal function or congestion</td>
</tr>
<tr>
<td>- Chen HH. JAMA 2013 Dec</td>
<td></td>
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<tr>
<td>- Double blinded RCT</td>
<td></td>
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<tr>
<td>- Cuffe MS. JAMA 2002.</td>
<td>$N = 951$ NYHA class III or IV</td>
<td>Randomized to receive placebo or milrinone 0.5ug/kg per min x 48 hrs</td>
<td>Milrinone slightly increased mortality and new atrial arrhythmia.</td>
</tr>
<tr>
<td>- Prospective RCT</td>
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Ultrafiltration vs loop diuretics

Loop diuretics (furosemide)
- No mortality benefit
- Causes hypokalemia
- DOSE-AHA trial: may increase mortality at doses > 120mg/day (IV)

Ultrafiltration
- AHA & ACC recommendation (2013):
  - Volume overload not responding to medical therapy
Back to Mr. DM:
- Treated with nesiritide (standard dose) x 48 hrs
- SCr ↓ to 1.2
- Doubled exercise capacity

Good news!!
Patient agreed to have AICD

Discharged with home meds +
- Spironolactone (new)
- Nephrologist to restart lisinopril
Any questions?
Biodiversity, Bioprospecting and Development Related Journals

- Journal of Bioprocessing & Biotechniques
- Journal of Bioremediation & Biodegradation
- Journal of Bioequivalence & Bioavailability
- Journal of Biodiversity & Endangered Species
Biodiversity, Bioprospecting and Development
Related Conferences

- 3rd International Conference on Earth Science & Climate Change
- 3rd World Congress on Biotechnology
- 5th World Congress on Bioavailability and Bioequivalence: Pharmaceutical R&D Summit
- 3rd International Conference on Biodiversity & Sustainable Energy Development
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