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ACUTE DECOMPENSATD HEART FAILURE AND CARDIORENAL SYNDROME

AHMAD AL RIYAHI

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 → 4600**
  - Troponin = 0.04 (unchanged)
  - BUN = 18
  - TSH = 3.01
  - LFTs = WNL
  - WBC = 9.8
  - Hgb = 10.4
  - K = 4.3

Patient infomration

- 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 infomration

- 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 ≤ 35%, SCr ≤ 2.5 in men or ≤ 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) → 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

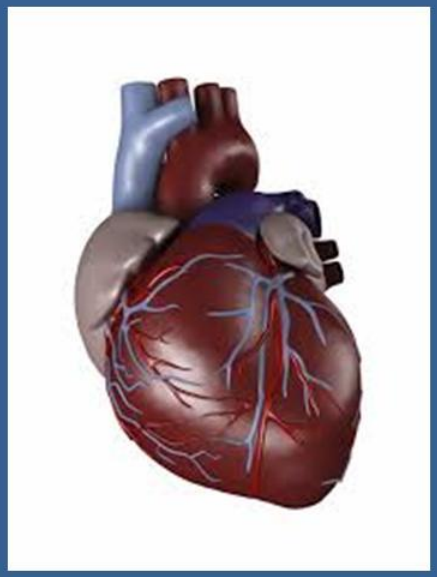
Renocardiac:

- 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

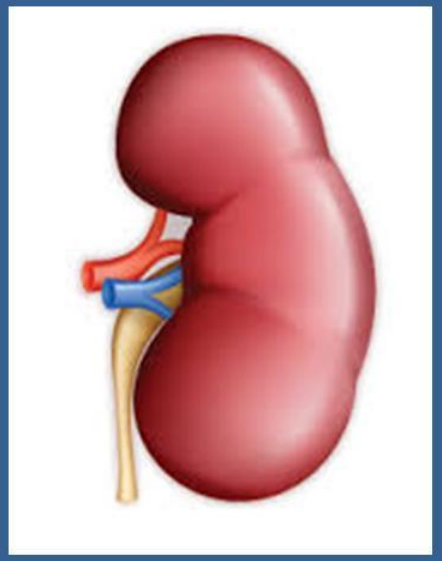
CRS



Decreased CO

RAAS activation

Sympathetic activation



In CRS:

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

1. Mullens W. *J Am Coll Cardiol*. 2008

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
  - Ultrafirltration: for diuretic resistance

Ronco C. *Eur Heart J*. 2010

Vasodilator: Nesiritide

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

Inotropes

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

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?

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