CONGESTIVE HEART FAILURE WITH RESULTING CARDIAC CACHEXIA

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March 6th, 2012
Your Heart

• The heart has four chambers-two on the right and two on the left:
  • Two upper chambers called atria
  • Two lower chambers called ventricles

• Oxygen-rich blood travels from the lungs to the left atrium, then on to the left ventricle, which pumps it to the rest of the body.

• The right atria takes in oxygen-depleted blood from the rest of the body and sends it back out to the lungs through the right ventricle.
  • For the heart to function properly, the four chambers must beat in an organized way.
What is Congestive Heart Failure?

- It is a chronic, progressive condition when the heart muscle is unable to pump enough blood through the heart to meet the body’s needs for blood and oxygen.

- CHF, also known as HF, is an impairment of the ventricles’ capacity to eject blood from the heart or have the ability to fill them with blood.

- HF represents the end stage of all forms of cardiovascular disease.
Pathophysiology

• Begins with an injury to the heart
  • Many times it is CAD, HTN, or MI

• Different mechanisms try to compensate for impairments:
  • Renin-angiotensin-aldosterone system
    • The heart becomes weakened and dilated
    • Myocardial fibrosis limits ability of walls to respond to stresses
    • Oxidative damage further impairs contractibility
    • Overall structure of the heart becomes damaged so badly that it cannot function properly
Pathophysiology

• HF patients typically have elevated blood and tissue levels of:
  • Norepinephrine
  • Aldosterone
  • Endothelin
  • Vasopressin

• High levels have adverse effects on cardiac structure
  • Contribute to fluid restriction and vasoconstriction
Pathophysiology

• Left Ventricle Hypertrophy
  • Result of extended periods of hypertension
  • Initiates HF by reducing extensibility of LV wall and contractibility
  • Weakened structure of cardiac wall leads to dilation

• Result
  • Decrease in cardiac output and ejection fraction
  • Decrease renal blood flow
  • Kidney response: activate renin-angiotensin-aldosterone system
    • Attempts to raise blood pressure and restore blood flow
  • Attempt increases levels of angiotensin II and aldosterone
    • Afterload increases, edema develops, HF progresses
Pathophysiology

• Reason for SOB
  • When there is decreased blood flow to the kidneys, it results in an increase of Aldosterone, which enhances sodium retention.
  • ADH is secreted as well which promotes water retention.

• Increased aldosterone found in many other mechanisms related to heart failure
  • Increased risk for cardiac arrhythmias
  • Endothelial dysfunction
  • Reduced cardiac norepinephrine uptake
Cardiac Cachexia

- CVD associated malnutrition/wasting syndrome characterized by skeletal muscle wasting, fatigue, and anorexia.
- Assumed that it is multifactual, involved in both metabolic and hormonal abnormalities
- Physiological contributor to cachexia:
  - Malabsorption due to reduced gut circulation and gut edema
  - Edema leads to decreased fat absorption and protein loss
MNT for Cardiac Cachexia

- Sodium and fluid restriction
  - <2,000mg of sodium per day
  - <1,500mL of fluid per day

- Possible supplementation needed for:
  - Potassium
  - Magnesium
  - Thiamin
  - Riboflavin
  - Pyridoxine
Clinical Results

• Major Signs and Symptoms
  • Fatigue
  • SOB
  • Sodium and Fluid Retention

• Other Symptoms
  • Exercise intolerance
  • Poor adaption to cold temperatures
  • Constantly feeling tired
  • Weakness

• Non-obese, free-living patients with clinically-stable CHF have an inadequate intake of calories and protein and reduced energy availability for physical activity. (Grade III)(Aquilani, 2003)
Charles Peterman

- Age: 85 years old
- Gender: Male
- Occupation: Retired Physician
- Ethnic Background: Caucasian
- Household Members: Wife, age 82 and in good health

Onset of disease:
- Diagnosed with CHF for the past 2 years
- Hospitalized for CAD, HTN, and CHF
- Medical records show a long history of CAD, HTN, mitral valve insufficiency, and previous anterior MI
Chief Complaint

- Charles Peterman passed out and collapsed at home. He was brought to the emergency room by ambulance and was diagnosed with chronic heart failure upon arrival.
Patient History

- Family History
  - Mother and Father: HTN and CAD

- Nutrition History
  - Patients appetite has been poor for the last 6 months with fluid retention and weight loss
  - Difficulty eating due to SOB and nausea

- Previous Nutrition Therapy
  - No specific therapy.
  - Monitored salt intake for the past 2 years
  - Followed a low-fat, low-cholesterol diet for previous 10 years
Clinical Evaluations

• Heart
  • Diffuse PMI in AAL in LLD; Grade II holosystolic murmur at the apex radiating to the left sternal border, first heart sound diminished and second heart sound sound preserved, third heart sound present

• Skin: Gray, Moist
• Chest/Lungs: Rales in both bases posteriorly
• Abdomen: Ascites, no masses, liver tender to A&P
• Extremities: 4+ pedal edema
Assessment

- Anthropometric Measurements
- Biochemical Measurements
- Physical Evaluation
- Dietary History
Anthropometric Measurements

- Height: 5’10”
- Weight: 165 lbs
- IBW: 166 lbs
- %IBW: 99%
  - Interpretation: Cannot assess weight at this time due to fluid retention
Energy and Protein Requirements

Energy Needs

- BEE = 66.5 + (13.8 x wt.) + (5.7 x ht.) – (6.8 x age)
- = 66.5 + (13.8 x 75) + (5 x 177.8) – (6.8 x 85)
- = 1,536.5 kcals/day

- TEE = 1,536.5 kcal x 1.2 x 1.35
- = 2,489 kcals/day

- Kcal/kg = 75kg x 30kcal – 35kcal = 2250 kcal – 2625 kcal

Protein Needs: 75 kg x 1.37 = **103 g/kg/day**

- Protein needs clinically depleted patients should have a daily intake of at least 1.37 g protein/kg (Grade III)(EAL)
Fluid Requirements

• Fluid Requirements
  • 1mL/kcal x 2500kcal = 2500 mL/day

• For HF patient, fluid requirements differ
  • Fluid Restriction = 1500 mL/day
  • Helps to prevent fluid overload

• Foods and beverages counted within fluid allowance
  • Soups, popsicles, sherbet, ice cream, yogurt, custard, and gelatin

• Evidence supports a 1.5L per day fluid restriction. Studies found a benefit in the quality of life, edema, physical activity, and blood pressure. (Grade II)(Ramirez 2004)
## Biochemical Measurements

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal Value</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>3.5 – 5 g/dL</td>
<td>2.8g/dL</td>
<td>2.7g/dL</td>
<td>2.6g/dL</td>
</tr>
<tr>
<td>Prealbumin</td>
<td>16 – 35 g/dL</td>
<td>15g/dL</td>
<td>11g/dL</td>
<td>10g/dL</td>
</tr>
<tr>
<td>BUN</td>
<td>8 – 18 mg/dL</td>
<td>32mg/dL</td>
<td>34mg/dL</td>
<td>30mg/dL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.6 – 1.2 mg/dL</td>
<td>1.6mg/dL</td>
<td>1.7mg/dL</td>
<td>1.5mg/dL</td>
</tr>
<tr>
<td>ALT</td>
<td>4 – 36 U/L</td>
<td>100U/L</td>
<td>120U/L</td>
<td>115U/L</td>
</tr>
<tr>
<td>AST</td>
<td>0 -35 U/L</td>
<td>70U/L</td>
<td>80U/L</td>
<td>85U/L</td>
</tr>
<tr>
<td>Sodium</td>
<td>136- 145 mEq/L</td>
<td>132mEq/L</td>
<td>133mEq/L</td>
<td>133mEq/L</td>
</tr>
</tbody>
</table>
## Current Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Function</th>
<th>Drug – Nutrient Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldactone</td>
<td>Decreases angiotensin II production</td>
<td>Potential for hyperkalemia</td>
</tr>
<tr>
<td>Lanoxin</td>
<td>Treat heart failure and arrhythmias'</td>
<td>Potential for hypokalemia</td>
</tr>
<tr>
<td>Lasix</td>
<td>Decreases fluid retention</td>
<td>Potential for hypokalmeia</td>
</tr>
<tr>
<td>Lisinopril</td>
<td>Decreases angiotensin II production</td>
<td>Potential for hyperkalemia</td>
</tr>
<tr>
<td>Lopressor</td>
<td>Treats HBP, prevents chest pain, and improves survival after heart attack</td>
<td>Potential for hyperglycemia</td>
</tr>
<tr>
<td>Metamucil</td>
<td>Treats constipation by acting as bulk forming laxative</td>
<td>Potential to decrease absorption of minerals</td>
</tr>
<tr>
<td>Zocor</td>
<td>Decreases production of cholesterol in the liver</td>
<td>Avoid grapefruit, grapefruit juice and red yeast rice</td>
</tr>
</tbody>
</table>
Usual Dietary Intake

- Patient generally enjoys all foods.
  - Recently, only consumes soft foods
  - Ex: ice cream.

- Patient tries to drink two cans of Ensure Plus each day

24 Hr. Recall
- Only consumed sips of drinks for the past 24 hours

- Vitamin Intake
  - Centrum Silver 2 x/day
  - Calcium supplement 1,000 mg/day
Medical Diagnosis

End Stage CHF with Ascites and 4+ Edema

• After doctor recommended enteral feeding, patient got severe diarrhea

• Patient requested oral feedings and palliative care only

• We meet patient here
PES Statement

- Impaired nutrient utilization (NC-2.1) related to sodium and fluid retention from CHF as evidenced by an altered sodium value of 132mEq/L, pitting edema, ascites, and end-stage CHF.
Intervention

• Food and Nutrient Delivery
  • Meals and Snacks [ND-1]
    • Modify distribution, type, or amount of foods and nutrients within meals or at specified time
    • Initiate low sodium mechanical soft diet to alleviate diarrhea and enhance oral intake.
    • Initiate a sodium and fluid restricted diet

• Nutrition Education
  • Comprehensive Nutrition Education [E-2].
    • Educate patient on purpose of sodium and fluid restriction.
    • Provide nutrition education materials on CHF.
    • Nutrition education for increasing water soluble nutrients
Diet Order Recommendations

• Low Sodium Mechanical Soft Diet
  • Enteral feeding was initiated but discontinued due to severe diarrhea
  • Patient stated that he wanted no other extraordinary measures taken to prolong his life

• Sodium and Fluid Restriction
  • A restriction of sodium intake to less than 2,400mg per day and of total fluids to less than 1,500ml per day had a positive effect by decreasing the amount of extracellular fluid and hence the development of edema, (Grade II ) (Ramirez, 2004)
Diet Order Recommendations

• Increase following water soluble nutrient
  • Potassium

• Other supplement options for patients with CHF
  • Folate, B12, L-Arginine, Carnitine, Coenzyme q10, Calcium

• Vitamin supplementation reduces plasma homocysteine in this condition and it is suggested that this treatment could improve the endothelium-dependent vasodilatory capacity and reduce blood pressure (Grade III) (Anderson, 2005)
Palliative Care

- Improved quality of life care for patient and family

- Reduce pain and suffering

- Uses a multidisciplinary approach among all healthcare providers to make best decision for patient
Requested Act or Service

1. Is it permitted?
   No or Not Sure
   2. Is it covered by any national or organizational explicit guidance?
      Yes
      4. Do I personally have the education needed?
         Yes
         STOP
         Until additional education acquired
         No
         STOP
         Until current knowledge, skill, and competence demonstrated

   No
   3. Would it be reasonable for a dietetics practitioner to do?
      Yes
      5. Can I demonstrate the knowledge, skill, and competence?
         Yes
         STOP
         Until current knowledge, skill, and competence demonstrated
         No
         Proceed if authorization documented.

   No
   STOP
   The accountability is not assumed! Notify appropriate person(s)
   6. Do I accept responsibility and accountability for my actions?
      Yes
      Proceed if authorization documented.
      No
Individualized Goals

- Tolerate low sodium mechanical soft diet
- Restrict sodium: <1,500mL/day
  - Work with patient to understand sodium restrictions
- Liberalize choice of foods
  - To provide patient with best quality of life care
  - Make sure still Na+ restricted
Monitoring

- Monitor % of food intake
  - one week after start of mechanical soft diet

- Record adherence to mechanical soft/low sodium/fluid restricted diet

- Re-test and analyze lab values
  - 1-2 weeks post low sodium/fluid restricted diet

- Education by an RD as part of a multidisciplinary team for patients with HF help patients achieve and adhere to a sodium-restricted diet. (Grade II) (Arcand, 2005)
Follow-Up Recommendations

- Monthly check-up visits with Cardiologist Specialists
  - Test for abnormal heart murmur

- Bi-weekly check-up with Primary Doctor
  - Check for advancement of 4+ Pedal Edema
  - Evaluate lab values

- Check in with RD to discuss current diet recommendations
  - RD: monitor to make sure receiving best quality of care
End Result of Patient

- Patient had a living will that he stated he wanted no other extraordinary measures taken to prolong his life
- The patient was able to express his wishes verbally
  - He requested oral feedings and palliative care only
- Patient expired after 2-week hospitalization
 References


