Nutrition Management of the Bone Marrow Transplant Patient Complicated by Graft versus Host Disease

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UC San Diego Dietetic Intern
May 26, 2015
Patient History

- Subject Patient: HHH
- 50 year old, FLT3-positive acute myelogenous leukemia (AML) in November 2013.
- s/p allogeneic hematopoietic stem cell transplant on October 31, 2014. Patient’s sister served as a matched donor.
- Hospital stay was prolonged due to steroid refractory graft versus host disease (GVHD) of the gut and skin. She was discharged on January 23, 2015 after a three-month hospital stay.
- Returned back to the hospital on February 11, 2015 with failure to thrive, severe acidosis and likely GVHD of the gut.
Allogeneic HSC Transplant

- Associated with an increased risk for graft versus host disease

- Approximately 30-60% of allogeneic HSC transplant recipients will acquire GVHD (1).
<table>
<thead>
<tr>
<th>Stage</th>
<th>Skin</th>
<th>Liver</th>
<th>GI tract</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No rash due to GvHD</td>
<td>Bilirubin &lt;2 mg per 100 ml or 35 mol/l</td>
<td>None (&lt;280 ml/m²)</td>
</tr>
<tr>
<td>I</td>
<td>Maculopapular rash &lt;25% of body surface area without associated symptoms</td>
<td>Bilirubin from 2 to &lt;3 mg/100 ml or 35–50 mol/l</td>
<td>Diarrhea &gt;500–1000 ml/day (280–555 ml/m²²); nausea and emesis</td>
</tr>
<tr>
<td>II</td>
<td>Maculopapular rash or erythema with pruritis or other associated symptoms 25% of body surface area or localized desquamation</td>
<td>Bilirubin from 3 to &lt;6 mg/100 ml or 51–102 mol/l</td>
<td>Diarrhea &gt;1000–1500 ml/day (556–833 ml/m²²); nausea and emesis</td>
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<tr>
<td>III</td>
<td>Generalized erythroderma; symptomatic macular, papular or vesicular eruption with bullous formation or desquamation covering 50% of body surface area</td>
<td>Bilirubin 6 to &lt;15 mg/100 ml or 103–225 mol/l</td>
<td>Diarrhea &gt;1500 ml/day (&gt;833 ml/m²²); nausea and emesis</td>
</tr>
<tr>
<td>IV</td>
<td>Generalized exfoliative dermatitis or bullous eruption</td>
<td>Bilirubin &gt;15 mg/100 ml or &gt;225 mol/l</td>
<td>Diarrhea &gt;1500 ml/day (&gt;833 ml/m²²); nausea and emesis. Abdominal pain or ileus</td>
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NIH consensus criteria for classification of late acute and chronic GVHD. *Blood Marrow Transplant* 2009;114:702-708
Nutrition Related Consequences of GVHD

- Electrolyte losses
  - Cramping, pain, food intolerance
    - Diarrhoea / steatorrhoea
  - Pancreatic insufficiency
  - Protein losing enteropathy
    - Hypo-albuminemia
- Vitamin and mineral deficiencies
  - Reduced oral intake
    - Anorexia
  - Immunosuppressive drugs
    - GVHD-DT
    - Inflammation
      - Fatigue
        - Physical inactivity
      - Quality of life
        - Oedema
        - Myopathy
      - Weight loss and malnutrition
    - Catabolism
Nutrition Recommendations

Estimated Needs: BMT Patients
- 25-30 kcals / 30-35 kcals/kg
- Protein: 1.2-1.5 g/kg

Estimated Needs: BMT Patients w/ GVHD
- 30-35 kcals/kg
- Protein: 1.5-2 g/kg. Needs may be even higher in patients with significant malabsorption and/or protein losses (2).

Vitamin/Mineral Supplementation
- Varied
- MVT w/out minerals
Nutrition Support

- PO intake (alternate menu, nutrition supplements/shakes)
  - Low microbial while neutropenic

- Enteral nutrition

- Parenteral nutrition

- GVHD of the Gut: GVHD Diet w/ advancement per MD
## GVHD Dietary Guidelines

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Complete Bowel Rest (NPO)</th>
<th>TPN + IV Fluids usually continue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 2</td>
<td>Clear Liquids: lemon lime soda, ginger ale, gatorade, bottled water, strained fruit juices (no apple, prune, orange), broths, jello, frozen ice, popsicles,..</td>
<td>*White rice or plain spaghetti noodles per MD order</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Corn flakes, Rice Krispies, Special K, plain spaghetti noodles, steamed white rice, pretzels, plain bagel, English muffin, white bread/white dinner roll, saltines, unsalted crackers, jelly, sugar (All Phase 2 foods)</td>
<td>*Soy milk, Lactaid milk per MD.</td>
</tr>
<tr>
<td>Phase 4</td>
<td>Limit 2 yolks/day, flour and corn tortillas, rye bread, roast beef, turkey, ham sandwiches on white bread, 2% milk, pineapples, honeydew melon, cantaloupe, watermelon, green beans, cooked onions, sherbet (All Phase 3, 4 foods)</td>
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</table>
Initial Nutrition Assessment

- Seen by nutrition upon admission as a skin trigger

Anthropometrics at Admission:
- Height: 4’9” Admit Weight: 167#  BMI: 27.47

Estimated Nutrition Needs at Admit:
- 1350-1575 calories per day (30-35 kcals/45 kg Adj BW) and 67-90 g protein per day (1.5-2 g/kg AdjBW)
- Averaging 7 BM/day

Initial Nutrition Diagnosis:
- Altered GI fxn r/t medical condition including GVHD of the gut AEB persistent diarrhea.
Nutrition Recommendations

- If active GVHD, rec changing to GVHD diet II > III > IV > V
  - Diet advancement per MD

- Goal diet: Carb limited diet

- Insulin regimen to maintain POCT BS goal of < 180 mg/dl

- Whole blood zinc, Vitamin D and B12 to assess deficiency

- Addition of MVT w/out minerals

- Imodium and Metamucil to manage loose stools
Clinical Course

- Up to sixteen bowel movements a day

- TPN from February 22\textsuperscript{nd} to March 5\textsuperscript{th}
  - D15\%, AA5\% running at 55 ml/hr x 24 hrs
  - Lipids initially held \textit{r/t} patient’s history of hypertriglyceridemia until baseline measured
  - 180 ml/day of 20\% intralipids was added (15 ml/hr x 12 hrs)
  - TGs measured weekly
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<tbody>
<tr>
<td>Triglycerides</td>
<td>Latest Range: 10-170 mg/dL</td>
<td>Ref. Range: 10-170 mg/dL</td>
<td>276 (H)</td>
<td>219 (H)</td>
<td>270 (H)</td>
<td>199 (H)</td>
<td>196 (H)</td>
<td>217 (H)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ref. Range</th>
<th>10/16/2014 12:15</th>
<th>1/19/2015 00:45</th>
<th>2/11/2015 00:01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glyco Hgb (A1C)</td>
<td>Latest Range: 4.8-5.9 %</td>
<td>7.2 (H)</td>
<td>6.0 (H)</td>
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</tbody>
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<tbody>
<tr>
<td>Prealbumin</td>
<td>Latest Range: 20-40 mg/dL</td>
<td>Reference Range: 20-40 mg/dL</td>
<td>7 (L)</td>
<td>32</td>
<td>35</td>
</tr>
</tbody>
</table>
## Clinical Course

### Sample Calorie Count Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Calorie Count</th>
<th>Protein</th>
<th>% of Calorie Goal</th>
<th>% of Protein Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/3/15</td>
<td>305 Calories</td>
<td>25g</td>
<td>23%</td>
<td>37%</td>
</tr>
<tr>
<td>4/4/15</td>
<td>245 Calories</td>
<td>7g</td>
<td>18%</td>
<td>10%</td>
</tr>
<tr>
<td>4/5/15</td>
<td>280 Calories</td>
<td>7g</td>
<td>20%</td>
<td>10%</td>
</tr>
</tbody>
</table>

- PO diet restarted w/ calorie count
- Back and forth between GVHD II, GVHD III and GVHD IV
- Progression to Stage 3 GVHD of Liver
- TPN not appropriate given LFTs
- EN recs provided
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<tbody>
<tr>
<td><strong>Alkaline Phos</strong></td>
<td>Latest Range: 35-140 U/L</td>
<td>361 (H)</td>
<td>397 (H)</td>
<td>414 (H)</td>
<td>443 (H)</td>
<td>367 (H)</td>
<td>374 (H)</td>
<td>388 (H)</td>
<td>535 (H)</td>
</tr>
<tr>
<td><strong>ALT (SGPT)</strong></td>
<td>Latest Range: 0-33 U/L</td>
<td>34 (H)</td>
<td>36 (H)</td>
<td>31</td>
<td>33</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>35 (H)</td>
</tr>
<tr>
<td><strong>AST (SGOT)</strong></td>
<td>Latest Range: 0-32 U/L</td>
<td>32</td>
<td>34 (H)</td>
<td>22</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>35 (H)</td>
<td>38 (H)</td>
</tr>
<tr>
<td><strong>Bilirubin, Dir</strong></td>
<td>Latest Range: &lt;0.2 mg/dL</td>
<td>8.0 (H)</td>
<td>8.2 (H)</td>
<td>9.3 (H)</td>
<td>8.3 (H)</td>
<td>10.0 (H)</td>
<td>8.0 (H)</td>
<td>7.1 (H)</td>
<td></td>
</tr>
<tr>
<td><strong>Bilirubin, Tot</strong></td>
<td>Latest Range: &lt;1.20 mg/dL</td>
<td>7.86 (H)</td>
<td>9.14 (H)</td>
<td>9.15 (H)</td>
<td>10.72 (H)</td>
<td>9.59 (H)</td>
<td>11.47 (H)</td>
<td>9.09 (H)</td>
<td>8.32 (H)</td>
</tr>
</tbody>
</table>
# Pertinent Medications

<table>
<thead>
<tr>
<th>Nutritionally Relevant Medications</th>
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<tr>
<td><strong>Steroids</strong>&lt;br&gt;(Prednisone, Prednisolone, Solu-Medrol, Solu-Cortef)</td>
</tr>
<tr>
<td><strong>Tacrolimus</strong></td>
</tr>
<tr>
<td><strong>Antibiotics</strong></td>
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Patient Prognosis

- HHH continued to suffer from severe diarrhea and Stage Three GVHD of the liver. Her prognosis was very poor.

- In mid April, the patient made the decision to be placed on comfort care

- HHH passed in mid-April


