Complex Problems in Everyday Practice: Improving Outcomes

Rafael J. Rafols, MD, CWSP, FACHM, FAPWCA

Wound Management
Doctors Hospital at Renaissance
Edinburg, TX
Disclosures

Speaker’s Bureau:
- Shire/ Grafix
- Soluble Systems/ Theraskin

Honorarium:
- KCI/ Aceility

Consultant:
- Soluble Systems/ Theraskin
13 year old Hispanic female with history of ALL-B cell lymphoma, she was diagnosed March 2016. She was subsequently enrolled in AALL 1131 HR Arm A. Treatment included: VCR and DOXO and IT MTX.

By late 2016, she had achieved clinical remission and chemotherapy continued for maintenance.

She presented to the hospital December 30th, 2016 with fever and malaise.
She presented to the hospital December 30th, 2016 with fever and malaise, sore throat for 5 days

- Temp Axillary: H 99.2 DegF (DEC 31 08:00)
- Heart Rate Peripheral: H 105 bpm (DEC 31 08:00)
- Resp Rate: 20 br/min (DEC 31 08:00)
- SBP: 115 mmHg (DEC 31 08:00)
- DBP: 72 mmHg (DEC 31 08:00)
- SpO2: 99 % (DEC 31 08:00)
- Weight: 49.9 kg (DEC 30 19:05)
- Height: 160 cm (DEC 30 19:05)
- BMI: 19.5 (DEC 30 19:05)
## Lab Findings:

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Blood Cell Count</td>
<td>0.3 th/uL</td>
<td>CRIT</td>
</tr>
<tr>
<td>Red Blood Cell Count</td>
<td>1.32 m/uL</td>
<td>LOW</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>3.9 gm/dL</td>
<td>CRIT</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>11.8 %</td>
<td>CRIT</td>
</tr>
</tbody>
</table>

12/30/16
Further history revealed that about one month prior the patient had a pedicure done. Subsequently, she developed pain, swelling and tenderness. She admitted to using a sock to cover her wound from her mother out of fear of being hospitalized.

Plain film studies did not show any fracture or acute bony pathologic process. Cultures grew coagulase negative staph. A diagnosis of cellulitis with necrosis was made and she started coverage with Vancomycin and Cefepime. She was treated topically with Bactroban ointment.
1/5/2017: Bedside debridement with nail debridement avulsion done. Podiatry recommends possible distal phalanx amputation if condition does not improve

“Right third toe ulcer with necrosis of skin and bone. Toe cellulitis and gangrene. Plan is to continue wound care, IV antibiotics and wound care with HBO. No further plans for surgery at this time, but recall me if fevers become worse, toe necrosis further, or child becomes septic. It will be life over limb at that point and amputation will be needed.”
Diagnosis of Osteomyelitis

Bone Scan: Highly sensitive, lacks specificity

Bone Biopsy-Cultures: Gold Standard

MRI: Sensitivity is high, specificity about 75%
Bone Scan: 1/9/2017
Classification

Osteomyelitis

Acute vs. Chronic

Insurance Considerations

LCD/MAC
Fact Gathering

Patient

Diagnosis

Treatments

HBOT correct for the patient?

Considerations
Cierny-Mader’s Staging: Anatomical and Physiological

Type I: Medullary osteomyelitis

Type II: Superficial osteomyelitis

Type III: Localized osteomyelitis

Type IV: Diffuse osteomyelitis
## Physiological classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Host’s immune system</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>A host</td>
<td>Normal</td>
<td>Immunocompetent with good local vascularity</td>
</tr>
<tr>
<td>B host</td>
<td>Compromised</td>
<td>Local or systemic factors that compromise immunity or healing</td>
</tr>
<tr>
<td>C host</td>
<td>Prohibitive</td>
<td>Minimal disability, prohibitive morbidity anticipated, poor prognosis for cure, treatment worse than disease</td>
</tr>
<tr>
<td>Long bone / non-specified</td>
<td>Patient descriptor</td>
<td>Treatment method combination</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Adult</td>
<td>HBO₂ &amp; antibiotics &amp; debridement</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Adult</td>
<td>HBO₂ &amp; antibiotics</td>
<td>Class IIb</td>
</tr>
<tr>
<td>Adult</td>
<td>HBO₂ alone</td>
<td>Class III</td>
</tr>
<tr>
<td>Before debilitating surgery / amputation</td>
<td>HBO₂ antibiotics &amp; limited debridement</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Mandibular</td>
<td>Adult</td>
<td>HBO₂ &amp; antibiotics &amp; debridement</td>
</tr>
<tr>
<td>Adult</td>
<td>HBO₂ &amp; antibiotics</td>
<td>Class IIb</td>
</tr>
<tr>
<td>Adult</td>
<td>HBO₂ alone</td>
<td>Class III</td>
</tr>
<tr>
<td>Child</td>
<td>HBO₂ &amp; antibiotics &amp; limited debridement</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Child</td>
<td>HBO₂ &amp; antibiotics</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Spinal</td>
<td>Before debridement surgery / hardware removal</td>
<td>HBO₂ &amp; antibiotics</td>
</tr>
<tr>
<td>All patients</td>
<td>HBO₂ &amp; antibiotics &amp; limited debridement</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Cranial</td>
<td>Before debridement surgery / hardware removal</td>
<td>HBO₂ &amp; antibiotics</td>
</tr>
<tr>
<td>All patients</td>
<td>HBO₂ &amp; antibiotics &amp; limited debridement</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Malignant otitis externa</td>
<td>Tisch Stage III or IV</td>
<td>HBO₂ &amp; antibiotics &amp; debridement</td>
</tr>
<tr>
<td>Tisch Stage I or II</td>
<td>HBO₂ &amp; antibiotics &amp; debridement</td>
<td>Class IIa</td>
</tr>
<tr>
<td>Sternal</td>
<td>All patients</td>
<td>HBO₂ &amp; antibiotics &amp; limited debridement</td>
</tr>
<tr>
<td>Diabetic ulcer</td>
<td>Wagner Grade 3 or 4</td>
<td>HBO₂ &amp; antibiotics &amp; limited debridement</td>
</tr>
</tbody>
</table>
The American Heart Association Evidence-Based Scoring System

Classification of Recommendations
- **Class I**: Conditions for which there is evidence, general agreement, or both that a given procedure or treatment is useful and effective.
- **Class II**: Conditions for which there is conflicting evidence, a divergence of opinion, or both about the usefulness/efficacy of a procedure or treatment.
- **Class IIIa**: Weight of evidence/opinion is in favor of usefulness/efficacy.
- **Class IIIb**: Usefulness/efficacy is less well established by evidence/opinion.
- **Class III**: Conditions for which there is evidence, general agreement, or both that the procedure/treatment is not useful/effective and in some cases may be harmful.

Level of Evidence
- **Level of Evidence A**: Data derived from multiple randomized clinical trials
- **Level of Evidence B**: Data derived from a single randomized trial or nonrandomized studies
- **Level of Evidence C**: Consensus opinion of experts

Adjunct testing

TCOM

Measures O2 levels from the capillaries that has diffused to the capillaries

Measures blood flow to the tissues

Beneficial when PAD is suspected or pre or post angioplasty
Drugs that are incompatible with Hyperbaric Oxygen Therapy

Drugs that are incompatible with Hyperbaric Oxygen Therapy:

- Cis-Platinum
- Doxorubicin/Adriamycin
- Mafenide Acetate/Sulfamylon
Cis-Platinum

Affects fibroblasts proliferation

Collagen synthesis

HBO could increase cytotoxicity

Exception: CO, Gas Gangrene, Nec-Fac
Animal studies by Upton, et. al.

Tissue damage by extravasation

Found 87% mortality

Wait at least 3 days
Mafenide Acetate

Brook Army Burn Center

Topical antibiotic

Remove before HBOT
Treatment Plan

HBOT prescribed in lieu of more radical debridement

40 sessions for 90 min as tolerated using 2 ATA, M-F

Adjunctive IV antibiotics

ID and Podiatry following along
We go with HBOT
DOCTORS HOSPITAL at RENAISSANCE

Date: 3/26/17  TX: 8781

LEFT 7th Toe.
Hyperbaric Oxygen Therapy can be Extremely Beneficial

Consider all circumstances

Team approach