MECHANISMS OF HUMAN DISEASE AND PHARMACOLOGY & THERAPEUTICS

CASE-BASED SMALL GROUP DISCUSSION

MHD I
SESSION XVII

December 10, 2014

STUDENT COPY
Case scenario is adapted from a Case Report of the Massachusetts General Hospital

This case will challenge students to integrate pathophysiology and multiple disease processes from MHD I and Pharmacology/Therapeutics I.

Case Data:

Day 1

The patient is a 30-year old woman who presented to an urgent care clinic with a red, hard, painful lump on her right lower leg that developed 3 days earlier. She had no other skin lesions. She denied trauma to the area. She had not traveled and had not had recent exposure to animals. She felt otherwise well.

She has no known chronic medical problems.

She takes no medications (prescription or over the counter) and has no known drug allergies.

She does not smoke or use illicit drugs

She lives alone and works in an office.

On physical exam she was afebrile. There was an abscess with local erythema of 5-cm in diameter on the right upper pre-tibial region. Distal circulation and sensory and motor examinations were normal.

The lesion was incised under sterile conditions with local anesthesia. Purulent bloody discharge was drained and cultured. A wick was inserted and a dry sterile dressing was applied.

1. Develop a management plan for this patient.

Days 30-31

One month later, the patient slipped and fell in her home after which she reported severe posterior thoracic pain that radiated to the anterior chest and lower back. The pain did not respond to acetaminophen. Two days later she returned to the urgent care clinic with 10/10 pain that increased with any movement or breathing. She reported mildly decreased appetite without nausea, vomiting or weakness.
On examination she appeared comfortable. T 36.6 Celsius, BP 102/59, pulse 100, RR 18, oxygen saturation 98% on room air.
Thoracic paraspinal muscles were tender with spasm.
There was a healing ulcer with 1-cm eschar on the right lower leg with no erythema, crepitus or necrosis.
The remainder of the examination was normal.
Ketorlac was administered intramuscularly. The patient went home with instructions to return if the pain did not resolve.
The next day the patient went to an emergency department because of persistent back pain.
Cyclobenzaprine and oxycodone with acetaminophen were prescribed and she returned home.

2. What drug classes are ketorolac, cyclobenzaprine and oxycodone/acetaminophen? Would your diagnostic/management plans have included anything different at this time?

Day 34

Two days later, the patient arrives to an emergency department via ambulance. Her friend had found her at home unresponsive and moaning. EMS personnel were called. Nalaxone was administered enroute to the hospital with minimal response.

3. Why was naloxone administered?

On arrival to the ED the patient was agitated and aphasic. She responded to painful stimuli.
Vitals: Rectal temperature 39.6 degrees Celsius, blood pressure 74/56, pulse 146, respiratory rate 46 breaths/minute, oxygen saturation 83% on room air.
The skin was gray, warm, and clammy.
The left pupil was 5mm, the right pupil 4mm in diameter and both were minimally reactive.
The neck was supple.
The breath sounds were decreased in intensity and course rales were heard throughout both lung fields.
The cardiac exam revealed tachycardia, there were no murmurs. The abdomen was distended and firm without organomegaly. The nail beds were cyanotic. Plantar reflexes were flexor. There was a diffuse papular and pustular rash on the face, neck, chest and abdomen without involvement of the palms or soles. The right lower leg had the healing eschar. Pelvic examination was normal.

A differential diagnosis is developed and diagnostic tests are ordered. Despite multiple crystalloid fluid boluses, the patient remains hypotensive. A central venous catheter is inserted and norepinephrine is started. Oxygen saturation was 81% while receiving supplemental oxygen by means of a nonrebreather face mask. The trachea was intubated and mechanical ventilation is begun.

4. What is/are your initial diagnoses?

Below are results of initial diagnostic tests.

**Laboratory Data**

**CBC**

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>38.7/mm3</td>
</tr>
<tr>
<td>Hgb</td>
<td>12.9g/dL</td>
</tr>
<tr>
<td>Hct</td>
<td>38.6%</td>
</tr>
<tr>
<td>Platelets</td>
<td>108,000</td>
</tr>
</tbody>
</table>

Differential (%)

- Neutrophils: 39%
- Bands: 14%
- Lymphocytes: 34%
- Monocytes: 5%
- Eosinophils: 2%
- Basophils: 0%
- Metamyelocytes: 3%
- Myelocytes: 3%
Complete Metabolic Panel
Sodium 142 mmol/l
Potassium 5.1 mmol/l
Chloride 103 mmol/l
CO2 11 mmol/l
BUN 55 mg/dL
Creatinine 6.6 mg/dL
Calcium 7 mg/dL
Glucose 79 mg/dL
Protein 5.2 g/dL
Albumin 2.4 g/dL
Alk phos 51 U/liter
AST 1272 U/liter
ALT 1496 U/liter
Bilirubin, total 1.0 mg/dL

Troponin T 0.58 ng/ml (ref range 0.0-0.09)

Lactic Acid
Lactic Acid 13.5 mmol/liter (ref range 0.5 – 2.2)

Urinalysis
pH 5.5
Specific gravity 1.030
Appearance yellow, turbid
White cells negative
Nitrites negative
Urobilinogen negative
Bacteria 10-50
Red cells 3-4
White cells 5-10
White cell casts rare (per low power field)
Squamous epithelial cells none
Amorphous crystals none

Urine βHCG Negative

Arterial Blood Gas
Fraction of inspired oxygen 1.00
pH 7.21
pO2 57 mmHg
PCO2 40 mmHg
Bicarbonate 15mmol/l
**EKG** – Sinus tachycardia at 142 beats/minute with nonspecific ST-segment and T-wave abnormalities

**Chest X-ray** - Diffuse pulmonary infiltrates

5. Correlate the diagnostic data to the clinical scenario. What other test(s) do you think are indicated?

A CT scan of the chest was obtained without intravenous contrast and revealed diffuse bilateral patchy areas of consolidation and ground-glass opacities in the lungs, with superimposed intralobular septal thickening, small focal cavitations in the right upper and left lower lobes and small bilateral pleural effusions.

CT scan of the abdomen and pelvis showed a band of increased attenuation along the right lower pelvic sidewall that may represent thrombophlebitis. No free intraperitoneal air or abscess was seen.
CT scan of the brain, without the administration of contrast material, revealed multiple, diffuse, hyperdense foci in the frontal, parietal, temporal, and occipital lobes bilaterally, many at the junction of the gray and white matter and along the corpus callosum, locations that are consistent with intraparenchymal hemorrhage; there was also surrounding hypodensity which was consistent with edema.

6. How do these imaging results impact your differential diagnosis and management decisions?

7. Correlate the patient’s skin exam findings with the available data.

8. Summarize the case data available at this point.

9. The physicians caring for the patient considered the following bacteria as potential etiologic agents of her illness.

   Streptococcus pneumoniae
   Neisseria menigitidis
   Rickettsia rickettsiae
   Group A Streptococcal endotoxic shock
Staphylococcus aureus
Gram negative sepsis

Describe how each of them does, or does not, fit the clinical picture.

Despite broad spectrum antibiotics and maximal support the patient clinically deteriorated. The pupils became fixed and dilated. In consultation with the family, resuscitative measures were stopped and the patient died 14 hours after admission. A diagnostic test result was received.

10. What do you think the test result is?

11. Parameters for goal directed resuscitative therapy for this patient’s condition include

Central venous pressure (CVP)
Mean arterial blood pressure (MAP)
Central oxygen saturation (Scvo2) or mixed venous oxygen saturation (Svo2)
Explain what each of these parameters represents and the goals.

**Case 2 Unknown** – Students will not have case data until the session meets