

MECHANISMS OF HUMAN DISEASE
AND
PHARMACOLOGY & THERAPEUTICS

CASE-BASED SMALL GROUP DISCUSSION

**MHD I
SESSION 17**

December 5, 2017

STUDENT COPY

Case 1

Case scenario is adapted from Case Report of the Massachusetts General Hospital published in the New England Journal of Medicine.

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

Case Data:

Day 1

The patient is a 25-year old man who presented to an urgent care clinic with a red, hard, painful lump on his right lower leg that developed 3 days earlier. He had no other skin lesions. He denied known trauma to the area. He had not traveled and had no recent exposure to animals. He felt otherwise well and played his usual weekly football game the day before presentation.

He has no known chronic medical problems.

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

He does not smoke or use illicit drugs

He lives alone and is a graduate student.

On physical exam he 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 pre-tibial 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. During the procedure the patient offered that several members of his football team have had similar “boils” on their skin.

Gram stain of the discharge shows Gram positive cocci in clusters.

Learning Objectives

1. What is the most likely etiologic agent of this patient’s disease process?

2. The patient is discharged to home from the urgent care clinic. He is prescribed a course of oral antibiotics. Discuss whether you would agree or disagree with management with each of the listed antibiotics and why.

Clindamycin

Vancomycin

Trimethoprim-sulfamethoxazole

Piperacillin-Tazobactam

Metronidazole

Day 30

One month later, the patient slipped and fell in his apartment after which he reported severe posterior thoracic pain that radiated to the anterior chest and lower back. The pain did not respond to acetaminophen. Two days later he returned to the urgent care clinic with 10/10 pain that increased with any movement or breathing. He reported mildly decreased appetite without nausea, vomiting or weakness.

On examination he 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.

Day 34

Two days later, the patient arrives to an emergency department via ambulance. His friend had found him at home minimally responsive and moaning and called EMS. He reported to ED staff that the patient was having ongoing back pain and did not attend graduate school seminars for the past several days as a result.

On arrival to the ED the patient was agitated and aphasic. He 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 cool and clammy.

The left pupil was 4mm, the right pupil 5mm in diameter and both were minimally reactive.

The neck was supple.

The breath sounds were decreased in intensity and coarse 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.

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.

3. What is/are your initial diagnoses?

4. Below are results of initial diagnostic tests. Correlate them to the clinical scenario. What other tests do you think are indicated?

Laboratory Data

CBC

WBC 38.7/mm³

Hgb 12.9g/dL

Hct 38.6%

Platelets 108,000

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
CO ₂	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

Arterial Blood Gas

Fraction of inspired oxygen	1.00
pH	7.21
PCO ₂	40 mmHg

pO₂ 57 mmHg
Bicarbonate 15mmol/l

EKG – Sinus tachycardia at 142 beats/minute with nonspecific ST-segment and T-wave abnormalities

Chest X-ray



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, consistent with intraparenchymal hemorrhage; there was also surrounding hypodensity which was consistent with edema.

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

6. Correlate the patient's skin exam findings with the available data.

7. Summarize the case data available to this point.

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

Streptococcus pneumoniae

Neisseria meningitidis

Rickettsia rickettsiae

Group A Streptococcal endotoxic shock

Staphylococcus aureus

Gram negative sepsis

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

9. Historical options 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 current recommendations for their use

Despite broad spectrum antibiotics and maximal support the patient clinically deteriorated. His 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? What is your final diagnosis?

Case 2

A 67-year old previously healthy man presents with gradual onset of fatigue over the last several weeks. Two days ago he noted the appearance of small red-purple dots on his skin. His gums have had some oozing of blood.

PMHx

Cholecystectomy at age 52

Right ankle fracture sustained while playing hockey age 23

Medications

Ibuprofen 600mg PRN headache and ankle pain– takes infrequently

Physical examination reveals a well-developed man in no acute distress.

Supine BP 110/72, pulse 110, Temperature 98.5⁰F

His skin and mucous membranes are pale. There are numerous petechiae on his legs and arms.

Abdominal exam is normal as are heart (aside from tachycardia) and lung exams.

Initial Laboratory Data

WBC	2.2	[4.0-10.0] k/ul
RBC	1.49	[3.60-5.50] m/ul
Hgb	6.5	[12.0-16.0] gm/dl
Hct	17.9	[34.0-51.0] %
MCV	86	[85-95] fl
MCH	28.3	[28.0-32.0] pg
MCHC	33.3	[32.0-36.0] gm/dl
RDW	15.1	[11.0-15.0] %
Plt Count	4	[150-400] k/ul

Learning Objectives

1. What is the main clinical problem?
2. Develop a differential diagnosis for the main clinical problem.

ADDITIONAL QUESTIONS WILL BE PROVIDED DURING THE SMALL GROUP SESSION