MECHANISMS OF HUMAN DISEASE
AND
PHARMACOLOGY & THERAPEUTICS

MHD II
Session 3

January 14, 2019

STUDENT COPY
Case 1
Cc: Terrible diarrhea for 1 ½ days

A 66 year-old woman presents to the traveler's clinic complaining of profound weakness and severe diarrhea of one and one-half days' duration. She has just returned from Africa where she worked for two months in a refugee camp on the border of Zimbabwe. On the plane she developed abdominal bloating, intestinal gurgling and nausea followed by two loose bowel movements. Soon she was having profuse watery diarrhea occurring hourly. Stools were clear and without odor. She denies having any blood in her stool. She has no previous history of diarrhea.

Her medications are levothyroxine 100mcg daily for hypothyroidism and monthly intramuscular cyanocobalamin injections for pernicious anemia.

You meet her in the clinic. She looks very weak. She is afebrile. Blood pressure is 94/60 lying down and drops to 72/40 standing. Oral mucosa is dry. Her lungs are clear to auscultation and percussion. On heart exam the patient is tachycardic, normal S1, S2, no murmurs. Her abdomen is nondistended. There is mild diffuse abdominal tenderness to palpation; there is no rebound tenderness or guarding.

She is admitted to the hospital.

Admitting laboratory studies include the following:

**BASIC METABOLIC PROFILE**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>134 L</td>
<td>[136-146] mm/l</td>
</tr>
<tr>
<td>Potassium</td>
<td>2.1 L</td>
<td>[3.3-5.1] mm/l</td>
</tr>
<tr>
<td>Chloride</td>
<td>105</td>
<td>[98-108] mm/l</td>
</tr>
<tr>
<td>CO2</td>
<td>15 L</td>
<td>[20-32] mm/l</td>
</tr>
<tr>
<td>Bun</td>
<td>34 H</td>
<td>[7-22] mg/dl</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.6 H</td>
<td>[0.7-1.4] mg/dl</td>
</tr>
<tr>
<td>Calcium</td>
<td>10.4 H</td>
<td>[8.9-10.3] mg/dl</td>
</tr>
</tbody>
</table>

Stool WBC NEG [NEG]
Fecal Occult Blood NEG [NEG]

**Learning Objectives**

1. Based on the information provided, what is the likely pathogenic mechanism of this patient’s diarrhea?

   Bacterial stool culture is sent and is growing colonies of curved, Gram negative rods.
2. What organism is most likely represented by the culture results?

3. What is the mechanism of transmission of this organism? What factor(s) put this patient at risk for infection with this organism?

4. Describe the mechanism of action of this organism’s toxin.

5. Besides toxin production, what other virulence determinant is essential for the development of infection with this organism?

6. Interpret the patient’s BMP.

7. How would you manage this patient’s hypovolemia? Why can oral rehydration fluid be used in many cases of infection with this organism?

8. You are with your preceptor in a traveler’s clinic. What advice would you give persons planning to travel to Sub-Saharan Africa concerning avoidance of infection with this organism?

9. List potential public health solutions to the global problem of epidemic infections with this organism.
Case 2

Cc: Diarrhea, abdominal pain x 1 week

An 8 year-old previously healthy boy is admitted to the Pediatric Inpatient Service. He had been well until 8 days prior to admission when he developed severe abdominal pain, nausea, vomiting and diarrhea. On the second day the diarrhea became bloody. The diarrhea continued but had lessened in amount, remaining bloody. The mother did not report any fever. On examination he appeared pale and had mild facial edema. Temperature was 37.6°C, pulse 104 and regular and the blood pressure was 140/95. His abdomen was tender.

Abdominal x-ray disclosed edema of the transverse and descending colon with thumbprinting.

1. What is the primary clinical problem? Develop a differential diagnosis.

The pediatric team is concerned about an infectious cause of the patient’s diarrhal illness and orders a stool culture to support their suspicion. Bacterial stool culture is growing sorbitol negative *Escherichia coli*.

2. What organism is likely the cause of the patient’s illness?

3. List the virulence characteristics of the organism.

4. How was the infection acquired? Include in your answer an explanation of how the most common vehicle of transmission is likely to cause large outbreaks.

5. Based on the given information, what additional diagnostic testing, if any, is warranted?

Additional data and questions for case will be provided to the students during the small group session.
Case 3

CC: I just cannot keep anything down x 3 days

HPI: A 33-year old woman presents with 3 days of nausea, vomiting, and abdominal discomfort characterized as crampy epigastric pain. She has thrown up most everything she takes in (solids and liquids). She has intermittent chills and sweats but no documented fever. She has had loose stools occasionally which did not represent a change from her baseline. She has had no melena, hematochezia or hematemesis. She has no known sick contacts.

PMHx:
HTN
Obesity s/p Roux-en-Y gastric bypass 5 years ago with subsequent loss of ~100 pounds. Her weight has been stable for the past few years
Migraine headaches
s/p cholecystectomy 10 years ago

Medications:
Nifedipine XL 60mg daily
Ibuprofen PRN

Social History:
Tobacco – active smoker, 1 pack cigarettes/day x 15 years
Alcohol – rare, minimal use
Lives with her 2 daughters (ages 8 and 11), and her mother
Employment – laid off from her job 1 year ago

Review of Systems
Pertinent positive: Neurologic – development of increased numbness and tingling sensations in both hands and feet over the past 3 months

Physical Exam:
Vitals: afebrile, pulse 115 beats/minute, BP 168/90, respiratory rate 14 breaths/minute, BMI 33
Cardiovascular, aside from tachycardia, normal and pulmonary examinations normal
Abdomen – slight epigastric tenderness on palpation without rebound or guarding
Neuro – sensation to light touch decreased from toes to just below knees; sensation of vibration absent at toes, decreased at ankles; deep tendon reflexes diminished at both knees and ankles. Toes downgoing in response to plantar stimulation.

The patient continues to have nausea and vomiting in the emergency department. Intravenous fluids are administered (1 liter of 0.9% sodium chloride followed by a continuous infusion of 5% dextrose in a solution of 0.45% sodium chloride). She is admitted to the hospital for further evaluation and management.

1. Discuss the resultant anatomy and intended physiology of a Roux-en-Y gastric bypass performed for surgical management of morbid obesity.
2. Based on the patient’s history, the third year medical student on the team asks the patient again whether she is taking any prescribed or over the counter medications besides nifedipine. The student specifies that “medications” include multivitamins and other vitamins. Why?

Remainder of case 3 will be provided during the small group session.

Case 4 Unknown – Data will be provided during the small group session