CASE 9.7
Meningitis | Level 3

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LEARNING OBJECTIVES

1. Identify presenting signs and symptoms of bacterial meningitis in a young child.
2. Evaluate cerebrospinal fluid results obtained from a child with suspected meningitis.
3. Develop a treatment plan for bacterial meningitis based on patient characteristics and laboratory results.
4. Establish treatment goals and outcomes for treatment of bacterial meningitis.
5. Detect a medication-related problem in the patient case.

CHIEF COMPLAINT: Fever, irritability, vomiting, and lethargy

History of Present Illness: This is a 13-month-old female who developed a fever (39.1°C) and irritability 3 days ago. She had not been sleeping well and was waking up crying but consolable. Her mother reports that there was no associated cough, congestion, or rhinorrhea at the onset of this illness. Two days prior to admission, her mother took the child to a local urgent care clinic where she was diagnosed with acute otitis media (AOM) and prescribed amoxicillin (she has taken three doses) and acetaminophen for pain and fever (she received two doses yesterday). At 4:00 a.m. this morning, the child became extremely irritable, was inconsolable, and vomited twice. Since that time, she has been difficult to arouse and has not had anything to eat or drink. Her mother was concerned and brought the child to the emergency department.

Review of Systems: Positive for lethargy, irritability, and fever; no cough, wheezing or SOB; positive for vomiting but no diarrhea; no joint swelling or erythema; no rash

Birth History: Born at 39 weeks gestation via normal spontaneous vaginal delivery; negative for group B *streptococcus* status of mother; no complications after birth; no hyperbilirubinemia; birth weight 3.2 kg

Past Medical History: Healthy until current illness/recent diagnosis of AOM

Past Surgical History: None

Development History: Normal with no concerns

Social History: Lives with mother and father; attends daycare 2 days/week; one 4-year-old sister; no pets; no smoke exposure

Family History: Dyslipidemia—maternal grandfather and father; atopic dermatitis—mother and sister

Diet: Normal toddler diet; drinks cow's milk and eats table foods

Immunizations: No vaccines

Allergies: NKDA

MEDICATION HISTORY

Medication	Sig	Start Date	End Date	Taking	Authorizing Provider
Amoxicillin	800 mg twice daily (10 mL of 400 mg/5 mL)	2 days PTA		Yes	Dr. Schultz
Acetaminophen	128 mg (4 mL of 160 mg/5 mL) q 4–6 hr prn	2 days PTA		Yes; as needed (2 doses yesterday)	Dr. Schultz

PHYSICAL EXAM

BP 94/50 mm Hg | Pulse 160 beats per min
Temp 39.7°C (rectal) | RR 40 breaths per min
Wt 9.6 kg | Ht 75 cm | SpO_2 97% (RA)

General Appearance: Lethargic; high-pitched cry elicited during exam

Head: Normal shape; fontanelles closed

Eyes: Conjunctiva clear; no eye discharge; red reflex present bilaterally

Ears: Left middle ear effusion, no TM erythema or bulging; right ear canal obscured by cerumen

Throat: Mucous membranes moist; no pharyngeal erythema or exudate

Neck: No lymphadenopathy; unable to assess range of motion fully as movement elicited crying

Lungs: Clear to auscultation

Heart: Tachycardic, normal S1/S2, no murmur

Abdomen: Soft, no distension; normal bowel sounds; no masses

Musculoskeletal: Normal range of motion; no edema

Skin: Cool, mottled, capillary refill 3 seconds; no petechiae or rash

Neurological: Lethargic but irritable with exam; negative Kernig's and Brudzinski's sign

LABORATORY DATA

Component	Value	Range
BASIC METABOLIC PANEL		
Glucose	140	60–110 mg/dL
BUN	20	2–13 mg/dL
Sodium	143	138–145 mmol/L
Potassium	4.0	3.5–5.9 mmol/L
Chloride	103	98–108 mmol/L
CO_2	14	19–30 mmol/L
Anion gap	26	6–16 mmol/L
Creatinine	0.9	0.2–0.4 mg/dL
Calcium	8.8	8.7–9.8 mg/dL
CALCULATED OSMOLALITY		
Calc osmo	285	285–295 mOsm/kg
CBC WITH DIFF		
WBC count	22.3	6.0–17.5 x 10^3/μL
RBC count	4.1	3.1–4.5 million/μL
Hemoglobin	13.3	9.5–13.5 g/dL
Hematocrit	39.9	29.0% to 41.0%
MCV	99.4	74.0–108.0 fL
MCH	28.3	25.0–35.0 pg
MCHC	33.2	30.0–36.0 g/dL
RDW	13.5	11.5% to 14.5%
Platelets	300	150–450 x 10^3/μL
MPV	10.3	9.4–12.4 fL
Neutrophils	55	34.0% to 71.1%
Immature granulocytes	15	0.0% to 0.5%
Lymphocytes	20.5	19.3% to 51.7%
Monocytes	8	3.0% to 13.0%
Eosinophils	0.9	0.7% to 5.8%
Basophils	0.6	0.1% to 1.2%
Procalcitonin	20.1	<0.05 mcg/L
C-reactive protein	10.5	<0.8 mg/L

BUN = blood urea nitrogen; CBC = complete blood count; CO_2 = carbon dioxide; MCH = mean corpuscular hemoglobin; MCHC = mean corpuscular hemoglobin concentration; MCV = mean cell volume; MPV = mean platelet volume; RBC = red blood cell; RDW = red cell distribution width; WBC = white blood cell.

DIAGNOSTIC TESTS

LP results: Hazy yellow fluid; glucose 40 mg/dL; protein 640 mg/dL; WBC 3,000/mm^3 (88% neutrophils, 12% lymphocytes); RBC 150,000/mm^3

CSF gram stain: Negative

CSF culture: Pending

Blood/urine cultures: Pending

MEDICATIONS AT ADMISSION

NS 100 mL IV bolus, followed by D5W–½NS plus 20 mEq/L KCl at 40 mL/hr

Dexamethasone 1.4 mg IV q 6 hr

Acetaminophen 128 mg po q 4–6 hr as needed for fever >38.6°C (101.5°F)

PROBLEM LIST

- ❑ Meningitis
- ❑ Mild dehydration
- ❑ Immunizations not up to date
- ❑ Otitis media

SELF-ASSESSMENT QUESTIONS

1. What subjective and objective evidence support the diagnosis of bacterial meningitis in this patient?
2. Develop a treatment plan for this patient's meningitis.
3. Assess the use of dexamethasone for this patient's meningitis.
4. Provide pertinent education for the parents regarding the prognosis and long-term outcomes for children with meningitis.
5. Discuss the medication-related problem in this patient and provide a recommendation for its management.