Board Simulation Session
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Question # 1: Photo

Of the following, which is most closely associated with these lesions.

• A. Pseudomonas aeruginosa
• B. Kawasaki disease
• C. Inflammatory bowel disease
• D. Lyme disease
• E. Parvovirus B19
Erythema Nodosum

• Inflammatory reaction to wide variety of agents and conditions
• Painful, indurated, erythematous/violaceous lesions
• Location
  • Shins characteristically, often symmetrical distribution
  • May be in upper extremities

ERYTHEMA NODOSUM: DIFFERENTIAL DIAGNOSIS

• Streptococcal infection-most common
• Fungal infection-Coccidioides and Histoplasma
• Tuberculosis
• Sarcoidosis
• Drug reaction
• SLE
• Inflammatory Bowel Disease
• Other bacterial infections-Tularemia, Leptospirosis
Question # 2: Photo

This 5 m-old infant presents with a 1-day history of high fever and irritability. On PE, he has an indurated, erythematous area on his left cheek without fluctuance. Of the following, the most appropriate therapy for this infant is:

• A. Topical mupirocin
• B. Oral anti-staphylococcal agent
• C. IVIG
• D. Systemic intravenous antibiotics
• E. Observation alone

Question # 3: Photo

A 14-year old girl undergoing chemotherapy for AML presents with fever, neutropenia, and this skin lesion. Of the following, the most likely agent causing this lesion is:

• A. Listeria monocytogenes
• B. S. aureus
• C. S. pyogenes
• D. Pseudomonas aeruginosa
• E. Candida albicans
ECTHYMA GANGRENOSUM

- Necrotic ulcer with black or gray eschar
- Sign of Pseudomonas sepsis in immunocompromised patient
- Also has been associated with other gram negative infections; Aspergillus; Candida infections, and S. aureus
- Blood and lesion cultures usually positive

Question #4: Photo

This patient presents with a rash and arthritis of the lower extremities. All of the following are complications of this disorder except:

A. IgG-mediated acute renal failure
B. Abdominal perforation
C. Intussusception
D. CNS manifestations
E. Hepatitis
HENOCHE-SCHONLEIN PURPURA: COMPLICATIONS

- Purpuric lesions and arthritis most common manifestations
- Gastrointestinal symptoms-50%
  - abdominal pain, vomiting, bloody stools
  - intussusception, obstruction, hemorrhage, perforation
  - corticosteroids indicated
- Renal involvement-25-50%
  - hematuria; nephrotic syndrome; IgA deposition
- Other complications-rare
  - CNS

Question #5

- An 8-months old boy presents with a 24-hour history of high fever and irritability. On PE he is toxic-appearing and has a bulging anterior fontanelle. CSF exam reveals:
  - 2100 WBC/mm² (90% PMN’s)
  - protein of 200 mg/dl; glucose 10 mg/dl
  - GS: gram-positive diplococci
- Of the following, the most appropriate initial antimicrobial regimen for this child is:
QUESTION #5

- A. Vancomycin
- B. Ceftriaxone
- C. Ampicillin and Ceftriaxone
- D. Ampicillin
- E. Vancomycin and Ceftriaxone

Question #6

A previously healthy 16-month old boy develops high fever for 5 days associated with irritability. PE is non-focal except for a pinpoint red rash on the trunk. 3 weeks prior to the onset of the fever, he was traveling with his family to India. Blood culture grows a gram-negative bacillus. Of the following, the most likely diagnosis is

- A. Shigella sonnei
- B. Aeromonas hydrophila
- C. Salmonella typhi
- D. Kingella kingii
- E. Pseudomonas aeruginosa

Question #7

- A 2-year old boy develops pallor and a purpuric rash.
- CBC reveals:
  - Hgb 6.5 gm/dl
  - WBC 1,200/mm³
  - Platelet count 20,000
Question #7
(continued)

Of the following, the agent most closely associated with this diagnosis is:

- A. Chloramphenicol
- B. Nafcillin
- C. Vancomycin
- D. Ceftazidime
- E. Clindamycin

Question #8

- An 8-week old presents with a 2-day history of dry cough and nasal congestion. PE reveals a well-appearing afebrile infant with a respiratory rate of 50/min. Mild subcostal retractions are present. Rhonchi and rales bilaterally are heard on auscultation. CXR reveals hyperinflation and diffuse interstitial markings.

Question #8 Answers

Of the following, the least likely to cause this clinical picture is:

- A. RSV
- B. GBS
- C. CMV
- D. C. trachomatis
- E. *Ureaplasma urealyticum*
Afebrile Pneumonia Syndrome

- 4-12 weeks of age
- Afebrile and well-appearing infants
- Mild respiratory symptoms; cough; rales and rhonchi typically heard
- Nonspecific CXR without focal infiltrates
- Differential diagnosis
  - C. trachomatis-most common cause
  - U. urealyticum
  - CMV
  - Pneumocystis jirovecii (carinii)
  - other viral agents

Question #9

A 6-month old presents for a well baby visit and routine immunizations. Upon examining the baby you note a white pupil on the left eye. The infant was born at 33 weeks gestation with a birth weight of 2000 grams. The LEAST likely cause of leukocoria in this infant is:

- A. Congenital cataract
- B. Glaucoma
- C. Retinoblastoma
- D. Retinopathy of prematurity

LEUKOCORIA: DIFFERENTIAL DIAGNOSIS

- Retinopathy of prematurity
  - Mainly those < 1500g and < 33wks gestation
- Cataracts
- Retinoblastoma
- Retinal detachment
- Larval granulomatosis-ocular larva migrans
Question #10:
Which of the following is true regarding the acute complications of RSV infection?

- A. Serious bacterial infection rarely complicates RSV disease.
- B. Apnea is a rare complication.
- C. Lower respiratory tract disease and respiratory failure are more common with re-infection than with primary infection.
- D. Immunocompromised children are at low risk for severe RSV disease.

RSV infection

- Secondary bacterial infections appear to be rare.
- Apnea is a common complication, esp in very young and premature infants.
- Primary infection more likely to cause severe disease.
- High-risk groups for severe infections:
  - Preterm infants and children with chronic lung disease.
  - Congenital heart disease (esp. hemodynamically significant cyanotic heart disease).
  - Immunocompromised individuals.

Question #11

A 5 year old girl with sickle cell disease develops osteomyelitis. The organism most likely to cause osteomyelitis in this child is:

- A. *Streptococcus pneumoniae*
- B. *Staphylococcus aureus*
- C. *Bacteroides fragilis*
- D. *Salmonella* sp
- E. Group A Streptococcus
Etiology of Osteomyelitis Complicating Sickle Cell Disease

- Salmonella is the most common cause of osteomyelitis in these patients
- S. aureus is the second most common cause
- Ratio of Salmonella: S. aureus
  - Prior to 1982: 7:1
  - Since 1981: 1.4:1
  - Overall: 2.2:1

Question #12

- A previously healthy 2-year old girl presents with an acute history of high fever, chills, vomiting, and diarrhea. On PE, she is pale, icteric, listless, febrile and tachycardic. She has hepatosplenomegaly. Lab evaluation reveals:
  - WBC 13.5 with 80% neutrophils
  - Hgb 7.5 g/dL
  - platelets 90,000/mm³

Question 12 (continued)

- In the ED she becomes confused, and experiences a 5-minute tonic-clonic seizure, after which she becomes obtunded.
- One week prior to her presentation, she was with her family visiting relatives in sub-saharan Africa.
Question #12

Of the following, the most likely cause of this child’s symptoms is:

- A. *Mycobacterium tuberculosis*
- B. *Plasmodium falciparum*
- C. *Plasmodium vivax*
- D. West Nile virus
- E. Yellow Fever

**Malaria**

- Areas at greatest risk
  - Sub-saharan Africa
  - Papua New Guinea
  - Soloman Islands
- Intermediate risk
  - Haiti
  - Indian subcontinent
- Low risk
  - Southeast Asia and Latin America

**Malaria**

- Fever, chills, rigors, nausea, vomiting, diarrhea, cough, abdominal and back pain
  - fevers may be cyclic, appearing every two or three days
- Anemia and thrombocytopenia common
  - hemolysis and hypersplenism
- *Plasmodium falciparum*
  - potentially fatal
  - Febrile non-specific influenza-like illness
Malaria

- Features of *P. falciparum*
  - High degree of parasitemia
  - Chloroquine resistant
  - Cerebral malaria
  - Hypoglycemia
  - Respiratory failure and metabolic acidosis
  - Severe anemia secondary to hemolysis
  - Vascular collapse and shock
  - Renal failure
  - Noncardiogenic pulmonary edema

- Features of *P. vivax* and *P. ovale*
  - Anemia
  - Hypersplenism
  - Relapse
    - Can be as long as 3-5 years after primary infection secondary to latent hepatic stages
  - Features of *P. malariae*
    - Chronic asymptomatic parasitemia
    - Nephrotic syndrome

Congenital Malaria

- Perinatal transmission
- Most caused by *P. vivax* and *P. falciparum*
- Features similar to neonatal sepsis
  - Fever and nonspecific symptoms
Malaria-Diagnostic Tests

- Identifying parasites on stained blood films
- Thick and thin blood films
  - Thick-to find parasites that are small in number
  - Thin-to for species identification and degree of parasitemia
- Treatment
  - Severe malaria (>5% parasitemia)
    - ICU and parenteral therapy

Question #13

- A ten-year old boy with sickle cell disease is admitted to the hospital with fever to 39.5°C, a RR 50/min, costal retractions and a CXR which demonstrates a left lower lobe pneumonia.
- Antibiotic choice for this patient must be active against all of the following organisms EXCEPT:
Question #13
Answers

- A. *Pseudomonas aeruginosa*
- B. *S. pneumoniae*
- C. *H. influenzae* type b
- D. *Salmonella* sp.
- E. *Mycoplasma pneumoniae*

Q #14: Which of the following is a true statement regarding Lyme Disease?

- A. Carditis and aseptic meningitis are features of late disease
- B. Arthritis is a common early feature
- C. Amoxicillin is the treatment for children less than 8 years of age with early localized disease
- D. Repeated courses of antimicrobial therapy are often required
- E. Despite antimicrobial therapy, chronic Lyme disease is common

**CLINICAL MANIFESTATIONS OF LYME DISEASE IN CHILDREN**

- Early localized disease
  - Erythema migrans
  - Myalgias
  - Fatigue
  - Headache
  - Fever
  - Lymphadenopathy
  - Arthralgia
CLINICAL MANIFESTATIONS OF LYME DISEASE IN CHILDREN

- Early disseminated disease
  - Erythema migrans
  - Lymphadenopathy
  - Cranial neuritis-esp facial palsy
  - Meningitis
  - Carditis-esp heart block
  - Radiculoneuritis
  - Nonspecific symptoms
- Late disease-wks to months after initial illness
  - Arthritis-esp. knee
Lyme Disease: Treatment

- Doxycycline (≥ 8 years) or amoxicillin
  - Early disease: 14-21 days
  - Multiple rings: 21 days
  - Isolated VII nerve palsy: 21-28 days
  - Arthritis: 28 days
- Ceftriaxone 100 mg/kg/day (2 gm max) for 14-21 days (PCN is alternative)
  - Arthritis: persistent or recurrent (or repeat oral)
  - Carditis
  - Meningitis/encephalitis (14-28 days)

Question #15

- A 2-year old child presents to the ED with a 3-day history of bloody diarrhea, pallor, and lethargy. Several of the child's day care center mates have diarrhea; one has been hospitalized with dehydration, anemia and renal failure. You suspect hemolytic-uremic syndrome (HUS).
Question #15
Answers

Which of the following is a true statement concerning HUS?

- A. The prognosis is excellent in most cases
- B. The diagnosis of HUS is made by obtaining appropriate stool cultures
- C. Antibiotics effective against E. coli O157:H7 should be used to eradicate the organism
- D. CNS manifestations occur in 40% of patients

HEMOLYTIC-UREMIC SYNDROME

- Most common cause of acute renal failure in young children
- Most frequently follows STEC (EHEC) (O157:H7) intestinal infection
  - undercooked meat; unpasteurized milk, cider, contaminated swimming pools
- Microangiopathic hemolytic anemia, thrombocytopenia, acute renal failure
- CNS manifestations in < 10% (seizures, coma)

HUS

- Management
  - Meticulous medical management
  - Dialysis
  - Antibiotic therapy against E. coli (O157:H7) may increase risk of HUS/worsen course
- Prognosis
  - Over 90% survive acute phase and do well
Q #16: MATCH THE CLINICAL FINDINGS WITH THE MOST LIKELY AGENT OF BIOTERRORISM

16. Respiratory distress followed by shock; widened mediastinum

A. Yersinia pestis
B. Inhalational Anthrax
C. Cutaneous anthrax
D. Botulism
E. Smallpox
F. Tularemia

Q #17: MATCH THE CLINICAL FINDINGS WITH THE MOST LIKELY AGENT OF BIOTERRORISM

17. Flaccid paralysis

A. Yersinia pestis
B. Inhalational Anthrax
C. Cutaneous anthrax
D. Botulism
E. Smallpox
F. Tularemia

Q #18: MATCH THE CLINICAL FINDINGS WITH THE MOST LIKELY AGENT OF BIOTERRORISM

18. Painful regional lymphadenopathy; pneumonitis

A. Yersinia pestis
B. Inhalational Anthrax
C. Cutaneous anthrax
D. Botulism
E. Smallpox
F. Tularemia
Q #19: MATCH THE CLINICAL FINDINGS WITH THE MOST LIKELY AGENT OF BIOTERRORISM

- 19. Vesicular rash
  - A. Yersinia pestis
  - B. Inhalational Anthrax
  - C. Cutaneous anthrax
  - D. Botulism
  - E. Smallpox
  - F. Tularemia

Q #20: MATCH THE CLINICAL FINDINGS WITH THE MOST LIKELY AGENT OF BIOTERRORISM

- 20. Papular lesion; cervical lymphadenopathy
  - A. Yersinia pestis
  - B. Inhalational Anthrax
  - C. Cutaneous anthrax
  - D. Botulism
  - E. Smallpox
  - F. Tularemia

Q #21: MATCH THE CLINICAL FINDINGS WITH THE MOST LIKELY AGENT OF BIOTERRORISM

- 21. Painless ulceration → black eschar
  - A. Yersinia pestis
  - B. Inhalational Anthrax
  - C. Cutaneous anthrax
  - D. Botulism
  - E. Smallpox
  - F. Tularemia
Question #22: Which of the following is a true statement regarding infants of diabetic mothers?

- A. Most of these infants are small for gestational age.
- B. The neonatal mortality rate is similar to that of infants of nondiabetic mothers.
- C. They have an increased risk of congenital anomalies.
- D. Symptomatic hypoglycemia occurs in the majority of these infants.

IDM

- Increased risk of congenital anomalies:
  - Lumbosacral agenesis
  - Cardiac
  - Neural tube defects
  - Renal
  - Intestinal atresias
  - Small left colon syndrome transient delay in development of left side of colon
  - Holoprosencephaly
IDM

- Most are LGA
- Higher mortality rate than infants born to nondiabetic mothers
- Hypoglycemia occurs in 25-50% but most do not become symptomatic

Questions #23 and #24

- A six-year old girl with nephrotic syndrome presents with abdominal pain and fever. She takes 30mg/day of prednisone. She has no diarrhea or vomiting. Her abdominal pain has gradually worsened over the day and is now severe. On PE, her T 38.4, P 140, R 40, BP 90/60. She is ill appearing. Her abdomen is distended, with guarding and rigidity present. Bowel sounds are absent. WBC 14,000; Hct 30; plts normal; Na 130; BUN 23; Cr 0.8

Question #23

Answers

The MOST likely diagnosis is:
- A. Acute appendicitis
- B. Bacterial gastroenteritis
- C. Spontaneous peritonitis
- D. Bacterial pneumonia
- E. Intussusception
Question #24

Paracentesis confirms the presence of spontaneous bacterial peritonitis. Of the following, the MOST appropriate antibiotic regimen for this patient is:

- A. Ampicillin
- B. Gentamicin and Metronidazole
- C. Nafcillin
- D. Cefotaxime
- E. Clindamycin

PRIMARY PERITONITIS

- Extremely rare in healthy children
- Prior ascites from nephrotic syndrome, liver disease, collagen vascular disorder
- Hematogenous source in most cases
- Complement deficiencies in these disorders may play a role

PRIMARY PERITONITIS

- Bacteriology
  - *S. pneumoniae*
  - *E. coli*
  - Group A streptococci
  - **ANAEROBES NOT COMMON**
- Clinical Manifestations
  - Fever, abdominal pain and tenderness
PRIMARY PERITONITIS: DIAGNOSIS

• Important to distinguish primary from secondary
  - radiographic imaging
    - free air; CT and US rarely needed
  - sampling the peritoneal cavity
    - PMN count >250/ul
    - protein > 1gram
    - glucose <50mg/dl
    - Gram stain with only gram positives

PRIMARY PERITONITIS

• Antimicrobial therapy
  - Ampicillin and aminoglycoside, OR
  - Third- or fourth-generation cephalosporin
    - probably sufficient even for penicillin-resistant pneumococci
  - Optimal duration not established

Questions #25-30: Match the Antimicrobial Agent with the most likely adverse effect

• 25. Rifampin
• 26. Isoniazid
• 27. Pyrazinamide
• 28. Ethambutol
• 29. Methicillin
• 30. Ceftriaxone

A. Optic neuritis
B. Interstitial nephritis
C. Peripheral neuritis
D. Hyperuricemia
E. Biliary sludging
F. Staining of contact lenses
A 14-year old boy presents to the emergency department after being struck by a car while riding his bicycle. He was not wearing a helmet at the time of the impact. Physical findings include bloody discharge from the right middle ear and an area of ecchymosis in the right post-auricular area. Of the following, the most likely diagnosis is:

- A. Basilar skull fracture
- B. Subarachnoid hemorrhage
- C. Epidural hematoma
- D. Concussion

**Basilar Skull Fracture**

- Clinical features
  - hemotympanum
  - ecchymosis of mastoid area (Battle sign)
  - periorbital ecchymosis (raccoon eyes)
  - CSF otorrhea or rhinorrhea
  - unilateral hearing loss
  - CN VII or VIII involvement

**Basilar Skull Fracture**

- Epidural hematoma: rupture of Middle meningeal artery
  - LOC→ lucid interval→ neurologic deterioration
- Subarachnoid hemorrhage: severe HA and photophobia
Question #32

The boy in question 31 does well except for persistent clear otorrhea. Several days later, he develops a stiff neck, headache and fever. Lumbar puncture reveals 1250 white blood cells, 90% of which are neutrophils. Cerebrospinal fluid protein is 90 mg/dL and the glucose is 10 mg/dL. Of the following the most likely organism causing this boy’s meningitis is:

- A. *Staphylococcus aureus*
- B. *Neisseria meningitidis*
- C. *Streptococcus pneumoniae*
- D. *Eikenella corrodens*
- E. *Moraxella catarrhalis*

CSF Leak

- Well known complication of basilar skull fracture
- CSF otorrhea or rhinorrhea
- Organisms that normally inhabit the nasopharynx are most commonly associated with meningitis
  - Gain entry from the NP because of the anatomic disruption in the base of the skull
  - *S. pneumoniae* most common
  - *H. influenzae* (nontypable) also

Question #33

A 3 year old boy who is a heart transplant recipient is being treated with Ganciclovir for CMV pneumonia. Of the following, which is the most likely adverse effect of this therapy?

- A. anemia
- B. thrombocytopenia
- C. neutropenia
- D. renal dysfunction
- E. rash
A 7-year old boy who has a history of congenital hydrocephalus and has a VP shunt presents with lethargy, headaches and low-grade fever. Three weeks prior to his presentation, he underwent elective revision of his shunt. CSF from the shunt now reveals cloudy fluid. You suspect bacterial infection of the shunt.

Of the following, the most likely organism causing this infection in this child is:

- **A. S. pneumoniae**
- **B. N. meningitidis**
- **C. E. coli**
- **D. coagulase-negative staphylococcus**
- **E. P. aeruginosa**

**VPS infections**

- Skin flora
  - coagulase-negative staphylococci
  - S. aureus
  - P. acnes
  - Bacillus sp
  - Gram-negatives
    - enterics including *pseudomonas*
- Fungal
  - occasionally encountered
Question #35

A 1-day old term infant develops bilious vomiting. Abdominal film is shown. This infant’s condition is most closely associated with:

- A. Cystic fibrosis
- B. Turner syndrome
- C. Trisomy 21
- D. DiGeorge syndrome
- E. Vertebral anomalies

DUODENAL ATRESIA

- 25-40% of all intestinal atresias
- 50% of infants are premature
- Associated anomalies
  - Down syndrome: 20-30%
  - Malrotation: 20%
  - Esophageal atresia: 10-20%
- Clinical manifestations
  - Bilious vomiting without abdominal distension
  - Maternal polyhydramnios
  - “Double bubble sign”
Question #36

- A previously healthy 3-month old infant presents with a 1-week history of constipation, poor feeding, loss of facial expression and decreased movement of the extremities. PE reveals an alert afebrile infant, who has a feeble cry, little spontaneous movement, poor tone, ptosis, reduced extraocular movements and decreased deep tendon reflexes.

Question #36 Answers

The most likely diagnosis is:
- A. Sepsis
- B. Infant botulism
- C. Viral encephalitis
- D. Transverse myelitis
- E. Guillain-Barre syndrome

Question #37

- Of the following, the most appropriate plan for management for this infant is
  - A. IV Penicillin
  - B. IV Solumedrol
  - C. Botulism Immune Globulin
  - D. IV Gentamicin
  - E. Plasmapheresis
INFANT BOTULISM

- Previously healthy infant
- Ingestion of *C. botulinum* spores which germinate in the infant’s intestine
- History constipation, acute weakness, difficulty sucking, swallowing, or crying, or breathing
- R/O sepsis most common admitting DX
- Diagnosis: isolation of toxin or organism in serum or stool
- Therapy: supportive; BIG; No antibiotics

GUILLAIN-BARRE SYNDROME

- Polyradiculoneuritis--multifocal areas of inflammatory demyelination of nerve roots and peripheral nerves
- Flaccid areflexic paralysis with variable degree of motor weakness
- Autonomic signs (tachycardia, hypotension) and sensory symptoms not uncommon but overshadowed by motor signs

GUILLAIN-BARRE SYNDROME

- *Albumino-cytologic dissociation* in CSF is classic
  - Normal cell count with elevated protein
  - Association with *C. jejuni*
- Management
  - Monitoring for bulbar signs and respiratory compromise (VC); meticulous symptomatic care
  - Prognosis excellent in most cases
Answers to Questions

1. C  
2. D  
3. D  
4. C  
5. E  
6. C  
7. A  
8. B  
9. D  
10. A  

11. D  
12. B  
13. A  
14. C  
15. A  
16. B  
17. D  
18. A  
19. E  
20. F

Answers to Questions (continued)

21. C  
22. C  
23. C  
24. D  
25. F  
26. C  
27. D  
28. A  
29. B  
30. E  

31. A  
32. C  
33. C  
34. D  
35. C  
36. B  
37. C

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