

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD




Photo Opportunity I: Photos and Questions to Test Your Board Preparation


Rajesh Gandhi, MD
Director, HIV Clinical Services and Education
Massachusetts General Hospital
Professor of Medicine
Harvard Medical School

7/6/2022



Disclosures of Financial Relationships with Relevant Commercial Interests

- Scientific Advisory Board: Merck



INFECTIONIOUS DISEASE IMAGES
eMicrobes Digital Library

A Joint Project of the Massachusetts General Hospital Infectious Diseases Division and Microbiology Lab

Cases are from an educational web-site:
www.idimages.org

I acknowledge the contributors to the site for their case submissions and images.

3

Case 1

A woman in her forties presented with 6 days of fatigue, decreased appetite, fevers and chills. She also had severe headache and myalgias.

PMH: None.

SH: Patient was single and not sexually active. She denied cigarette, alcohol or illicit drug use. The patient had recently hiked in New Hampshire. She denied a history of tick bites. She had a dog but no other animal exposures.

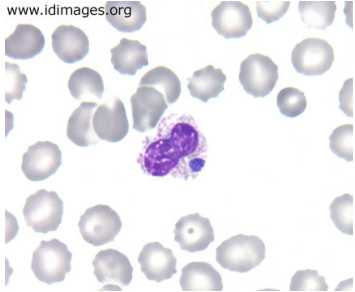
Contributed by Anne Kasmar, M.D.

4

PE: She appeared well. T 103.5, BP 104/50, HR 122, RR 18, O₂ sat 97% on RA. She had no rash or adenopathy. Remainder of exam was normal.

Studies: WBC 2.3 (51% P, 29% bands, 14% L, 4% atypical lymphocytes); Hct 39%; Platelets 24. Serum chemistries values, including LFTs, were normal. Blood cultures were negative. CXR: normal

5



www.idimages.org

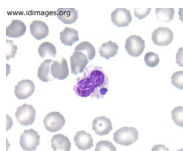
6

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD

Differential Diagnosis

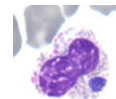
- A. Meningococemia
- B. Anaplasmosis
- C. Histoplasmosis
- D. Babesiosis
- E. “Spotless” Rocky Mountain Spotted Fever (RMSF)



7

Diagnosis and Follow-up

- Peripheral blood smear showed morulae inside white blood cells, consistent with anaplasmosis.

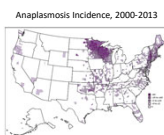


- Diagnosis confirmed with PCR testing.
- She was treated with doxycycline; symptoms completely resolved.

8

Anaplasmosis

- New England, north central states and West Coast.
- Caused by *Anaplasma phagocytophilum* transmitted by tick *Ixodes scapularis*
- Sx: fevers, chills, myalgias, headache. Rash <10%.
- Labs: leukopenia, thrombocytopenia, elevated transaminases.
- Dx: visualization of intraleukocytic bacteria (morulae) on blood smear (present in 20-80% of cases); serology (paired); serum PCR
- Treatment: doxycycline



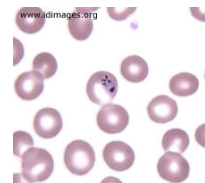
9

Rule out coinfection with Lyme, Babesia (same vector)

Lyme



Babesia



10

Differential diagnosis

- **Meningococemia:** patient did not have meningeal signs or rash to suggest acute meningococemia; did not have arthritis/tenosynovitis/rash to suggest chronic meningococemia
- **Histoplasmosis:** patient not immunosuppressed, which predisposes to disseminated histo; CXR not abnormal (infiltrates often present in histo)
- **Babesia:** ring-forms in red cells, not white cells
- **Rocky Mountain Spotted Fever:** would not explain morulae in WBC. RMSF (and human monocytotropic ehrlichiosis) more common in southeast, south central US

11

Case 2

60 yo M with history of renal transplant developed multiple erythematous, raised, pruritic lesions on his thighs over the course of several weeks.

PMH: ESRD due to post-streptococcal glomerulonephritis, s/p cadaveric renal transplant in 1982; HCV infection.

Meds: prednisone 15 mg qd; azathioprine 150 mg qd

SH: Patient had healthy cat at home. Lived in rural Virginia near farm animals and frequently saw deer in his yard. Avid gardener but no recent puncture wounds. Several tick bites in the past year. Travel history: Central America 2 yrs ago.

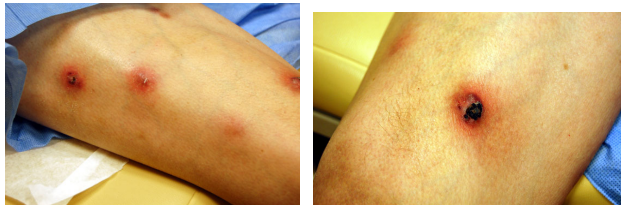
Contributed by Raj Gandhi, M.D.

12

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD

PE: T: 36.8. Multiple erythematous nodules on both lower extremities. Lesions were tender and non-fluctuant, some with a central necrotic area. There was no discharge. The remainder of his exam was normal.



13

Studies: WBC 3.3; Hematocrit 26%; Platelets 118,000; BUN 59 mg/dL, Creatinine 2.1 mg/dL; Bilirubin (total/direct) 2.1/1.3; AST 70; Alkaline Phosphatase 321.

CXR: normal

Blood Cultures: no growth

14

Differential Diagnosis

1. Cryoglobulinemic vasculitis related to HCV infection
2. Nocardiosis
3. Nontuberculous mycobacteria
4. Cutaneous aspergillus
5. Botryomycosis



15

Diagnosis and Follow-up

- Patient underwent skin biopsy of a lesion on his lower extremity.
- Microscopic examination: abscess containing many polymorphonuclear leukocytes, scattered multinucleated giant cells.
- Special stains revealed acid-fast bacilli.
- Culture grew *Mycobacterium chelonae*.

16

M. chelonae

- Rapidly-growing mycobacteria
- Some strains grow best at 28-33°C
 - May account for its proclivity to cause cutaneous lesions on the extremities
- *M. chelonae* most commonly causes skin, bone and soft tissue infection
 - Disseminated cutaneous infection occurs in immunocompromised hosts, such as transplant patients and individuals on chronic steroids
 - Keratitis associated with contact lenses' wear and LASIK
 - Surgical site infection reported after cosmetic surgery, other invasive procedures

17

Case 3


60 yo M was well until day of admission when he developed lethargy and confusion. Over the course of the day, his hands and feet grew cold and numb and he developed a rash.

SH: He lives in a rural area (mountain-lion territory) and drinks well-water. He has a history of alcohol abuse. He rides horses and has dogs, one of whom bit him a few days before.

18

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD



www.idimages.org
© 2010 IDSA

PE: T 102. Nonblanching, nonpalpable, purpuric patches on head, trunk, thighs; puncture wounds on dorsal aspect of hand; edema, cyanosis of nose.

A. *E. coli* 0157:H7
B. *Yersinia pestis*
C. *Pasteurella*
D. *Capnocytophaga*
E. Leptospirosis

19

Capnocytophaga canimorsus

- Blood cultures positive for *C. canimorsus*
- Facultative, fastidious gram-negative bacillus found in the mouth of dogs, cats.
- Risk factors: male sex, dog-bite, alcohol abuse, asplenia, immunosuppression
- Septicemia: 20-40% have a rash (maculopapular, progressing to purpura fulminans)

20

Differential diagnosis

- ***E. coli* 0157:H7**: abdominal cramping, diarrhea; fever typically absent
- ***Yersinia pestis***: usually presents as bubonic plague, with regional lymphadenitis
- ***Pasteurella***: may follow cat or dog bite; usually presents with cellulitis; septicemia uncommon
- **Leptospirosis**: contact with urine or tissue of infected animals; in acute phase, pt may have conjunctival suffusion; purpura fulminans, as in this case, would be unusual

21

Case 4

30 yo woman with HIV (CD4 cell count 20, not on therapy) presented with gradual onset of word-finding difficulties, expressive aphasia and right upper extremity weakness over 4 weeks.

SH: She lived in New England. No recent travel or known insect bites. Not sexually active.

PE: On exam, she was afebrile. She had oral thrush. She had difficulty naming objects and right-sided weakness.

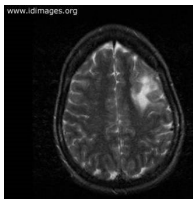
Studies: WBC count of 2.2 (44% P, 45% L)

Contributed by Wendy Yeh, M.D.

22

Her clinical syndrome is most likely caused by:

- A. An arbovirus
- B. A polyomavirus
- C. A herpes virus
- D. A spirochete
- E. A dematiaceous fungus



MRI: Abnormal T2 signal involving white matter, left fronto-parietal region. No enhancement, edema, mass effect

23

Progressive multifocal leukoencephalopathy

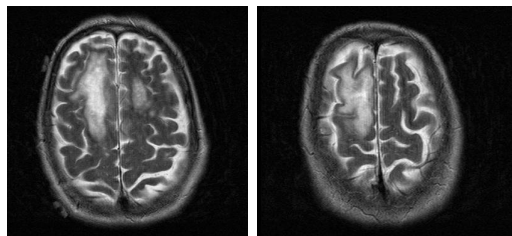
- CSF JC virus positive
- Demyelinating disease of central nervous system caused by reactivation of JC virus, a polyoma virus
- Immunocompromised hosts (heme malignancy; HIV, natalizumab, rituximab)
- Rapidly progressive focal neurologic deficits, usually due to cerebral white matter disease.
- Rx: reversal of immunodeficiency. In people with HIV: antiretroviral therapy

24

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD

PML



Contributed by Vince Marconi, M.D.

25

Differential diagnosis

- **Arbovirus, such as West Nile Virus:** Unlikely because of no confusion, headache, meningeal signs, paralysis.
- **Herpes virus, such as HSV:** temporal lobe.
- **Spirochetal infection, such as syphilis:** central nervous system gumma or stroke-like syndrome (meningovascular disease).
- **Dematiaceous fungus:** no risk factors (e.g. adjacent paranasal sinus infection, penetrating trauma); lack of enhancement of brain lesion on head imaging.

26

Case 5

50 yo F developed ulcerated lesion on her left thumb which enlarged over several months despite several courses of antibiotics. She reported no sore throat, fever, chills, dyspnea or cough.

SH: Three months before, she travelled to Ecuador, where she stayed in an ecotourism hotel near a river. No known fresh- or salt-water exposure. Reported seeing several kinds of insects and receiving several bites. No known animal exposures or tick bites.

Contributed by Rojelio Mejia, MD

27

Differential Diagnosis

PE: Patient appeared well. T 98.1.

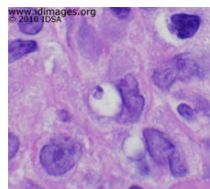
Raised ulcerated lesion on thumb with a violaceous border

- A. Cutaneous leishmaniasis
- B. *Mycobacterium marinum*
- C. Sporotrichosis
- D. Pyoderma gangrenosum
- E. Tularemia

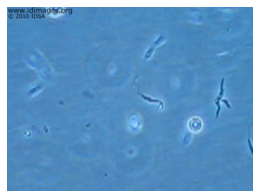


28

Skin biopsy showed amastigote, with kinetoplast in a vacuole. Culture of tissue from skin biopsy in Schneider's Media revealed promastigotes. PCR of tissue: *Leishmania guyanensis*.



Skin biopsy, H and E stain



Culture of skin biopsy tissue in Schneider's medium

29

Treated with liposomal amphotericin



One week after treatment



Follow-up at 3 months



30

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD

Differential Diagnosis

- **Mycobacterium marinum**: patient did not have known fresh- or salt-water exposure; she did not have nodular lymphangitis
- **Sporotrichosis**: no known exposures to soil or thorn; she did not have nodular lymphangitis
- **Pyoderma gangrenosum**: patient did not have known inflammatory bowel disease or other underlying pre-disposing condition; ulcerative PG usually occurs on lower extremities, trunk
- **Tularemia**: no animal or tick exposure; no systemic symptoms; no adenopathy

31

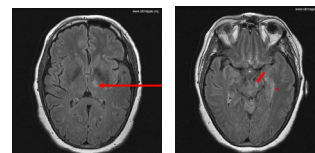
Case 6

Woman in her 50s presented with fatigue, confusion, word-finding difficulties and fever for 3 days

SH: Lived in Midwestern US. Avid outdoors person, frequently in wooded areas; husband recalls pulling a tick off her trunk recently

PE: T 101.3. Somnolent woman, oriented only to self

CSF: WBC 146 (9% N, 56% L, 35% M); RBC 14; Glc 70; Pro 109



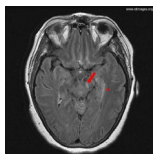
MRI: T2 hyperintensity left thalamus and substantia nigra; leptomeningeal enhancement

Contributed by Joy Chen, M.D. and Virk Abinash, M.D.

32

Differential Diagnosis

- A. Neisseria meningitidis meningitis
- B. Herpes simplex virus encephalitis
- C. Lyme meningoencephalitis
- D. Powassan meningoencephalitis
- E. Lymphocytic choriomeningitis



33

Diagnostic Procedures & Results

- CSF gram stain, fungal smear, bacterial and fungal cultures were negative
- CSF PCR tests for HSV, WNV, VZV, CMV negative
- CSF positive for immunoglobulin M against Powassan virus by ELISA. Confirmed at CDC

34

Powassan Encephalitis

- Transmitted by *Ixodid* ticks
- Northeast, upper Midwestern (Great Lakes) US
- Transmission period April-December
- Incubation period up to 4 weeks
- Fever, confusion, seizures, focal neurologic deficits
- CSF: lymphocytic pleocytosis
- Diagnosis:
 - MRI: T2 hyperintensity in thalamus, basal ganglia, brainstem
 - Positive IgM antibody; confirmed at CDC with PRNT



www.cdc.gov/powassan/statistics.html

35

Case 7

60 yo M presented to ED with a few hours of severe pain in right upper extremity. There was no history of trauma. Exam was normal with no obvious skin changes. He was discharged home. Over the next few hours, he developed progressive swelling of right upper extremity.

Exam: right upper extremity was diffusely swollen with a deep-red discoloration; several bullae.

Studies: WBC 8,900 (47% polys, 38% bands). X-ray: air in soft tissues.

Contributed by Steve Calderwood, M.D.

36

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD

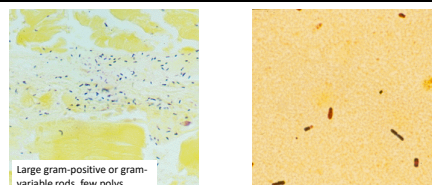
Does this patient most likely have:

- A. *Vibrio vulnificus*
- B. Group A streptococcal necrotizing fasciitis
- C. Mixed aerobic/anaerobic necrotizing fasciitis
- D. Clostridial gas gangrene
- E. Bullous pemphigoid



37

Diagnosis



Surgical cultures grew *Clostridium septicum*.

In retrospect, patient reported several month history of bright red blood per rectum. Subsequent evaluation revealed an invasive colonic carcinoma.

38

Gas Gangrene

- Traumatic gas gangrene generally due to *C. perfringens*, sometimes other Clostridial species
- Spontaneous (non-traumatic) gas gangrene most commonly due to *C. septicum*
- *C. septicum* infection associated with malignancy
 - In one series, 81% had malignancy; in 37% the cancer was occult¹
 - Most common cancers: colorectal, hematologic.

Kornbluth et al. Medicine (1989) 68:30

39

Differential Diagnosis

- ***Vibrio vulnificus***: patient with liver disease, iron overload, or immunocompromising condition.
- **Group A streptococcal necrotizing fasciitis**: Would not result in air in soft tissues
- **Mixed aerobic/anaerobic necrotizing fasciitis**: after trauma or surgery
- **Bullous pemphigoid**: Would not present in such a fulminant manner nor would gas be present in tissues.

40

Case 8

50 yo F was well until 7 days prior to admission when she noted "bite" on left thigh. Lesion enlarged over several days. Four days prior to admission, developed fatigue, arthralgias, myalgias, fever, headache. On day of admission (July), developed generalized rash on extremities, trunk, back.

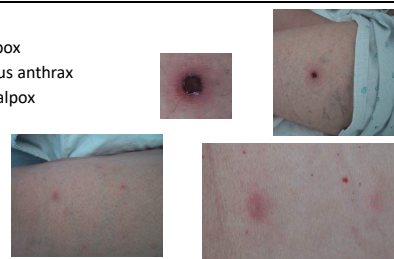
SH: Lived in New England. She had seen a mouse in her basement. She had a dog. Denied sexual activity.

PE: appeared well. T 100.5. No adenopathy. Lesion present on left thigh. Papular erythematous rash on her extremities, back, chest.

41

Does this patient most likely have:

- A. Varicella
- B. Monkeypox
- C. Cutaneous anthrax
- D. Rickettsialpox
- E. Lyme



42

12 – Photo Opportunity I: Photos and Questions to Test Your Board Preparation

Speaker: Rajesh Gandhi, MD

Case 9

55 yo M was admitted with nephrolithiasis and *E. coli* urosepsis. Course was complicated by ARDS, requiring prolonged ventilatory support and a tracheostomy. On hospital day 21, he developed a nosocomial MRSA pneumonia. On hospital day 28, he developed a new fever and rash.

PMH: HTN; AF. Medications: vancomycin, nifedipine, digoxin, coumadin.

Contributor: John Beigel, M.D.

43

PE: T 103.2. Skin: erythematous areas in the axillae, back, left thigh. On this erythematous base, there were tight bullae, which expressed yellow, serous, nonpurulent fluid when opened. Exam otherwise normal.

Studies: WBC 15.7 (84% P, 9% L, 3% M, 3% E), and hematocrit 28.6%. Cultures of the bullous fluid were negative.

44



45



46

Differential Diagnosis

- A. Dermatitis herpetiformis
- B. Bullous pemphigoid
- C. Linear IgA bullous disease from vancomycin
- D. Herpes zoster
- E. Staphylococcal scalded skin syndrome



47

 **INFECTIOUS DISEASE IMAGES**
eMicrobes Digital Library

A Joint Project of the Massachusetts General Hospital Infectious Diseases Division and Microbiology Lab

48