

ID Emergencies

Lise Harper, MD, MPH

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Disclosures

- Not ID trained
- Dr. Edwin Yu

Learning Objectives

- Bacterial meningitis
 - IDSA guidelines: Clin Infect Dis 2004; 39: 1267-84
- HSV encephalitis
 - IDSA guidelines: Clin Infect Dis 2008; 47: 303-27
- Necrotizing skin and soft tissue infections
 - IDSA guidelines: Clin Infect Dis 2014; 59: 10-52
- Clinical presentation
- Diagnosis
- Management

Question 1

- In patients with acute bacterial meningitis, what percentage of patients will present with the classic triad of symptoms – fever, neck stiffness and altered mental status?
 - *A. 15%*
 - *B. 40%*
 - *C. 80%*
 - *D. 95+%*

Clinical manifestations of bacterial meningitis

- Classic triad: fever, nuchal rigidity and altered mental status in 40%
- 95% will have 2 of 4: HA, fever, stiff neck, and altered mental status
- Most common clinical features:
 - Headache (84%)
 - Fever $>38^{\circ}\text{C}$ (74%)
 - Stiff neck (74%)
 - GCS <14 (71%)
 - Nausea (62%)

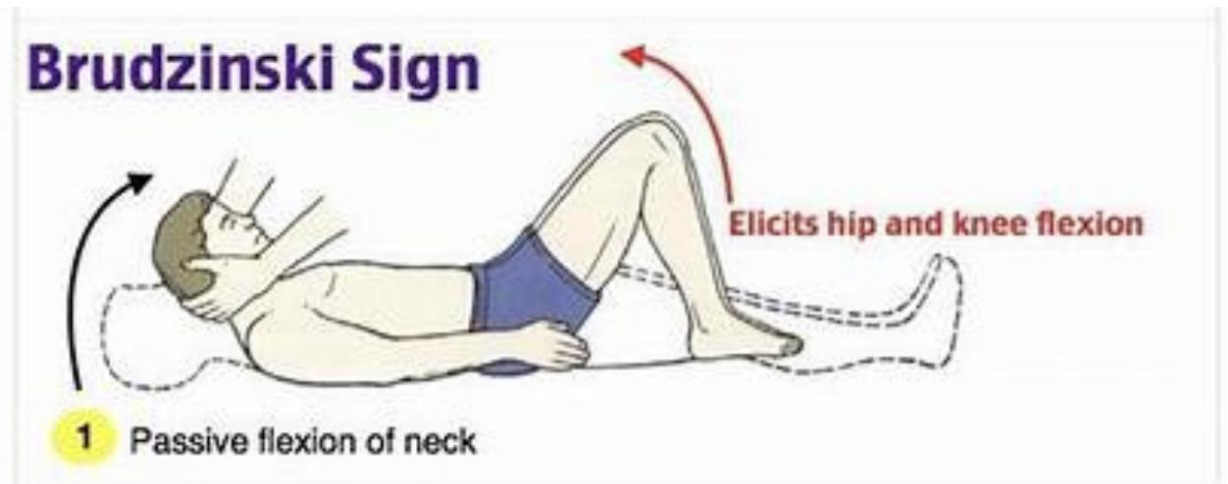
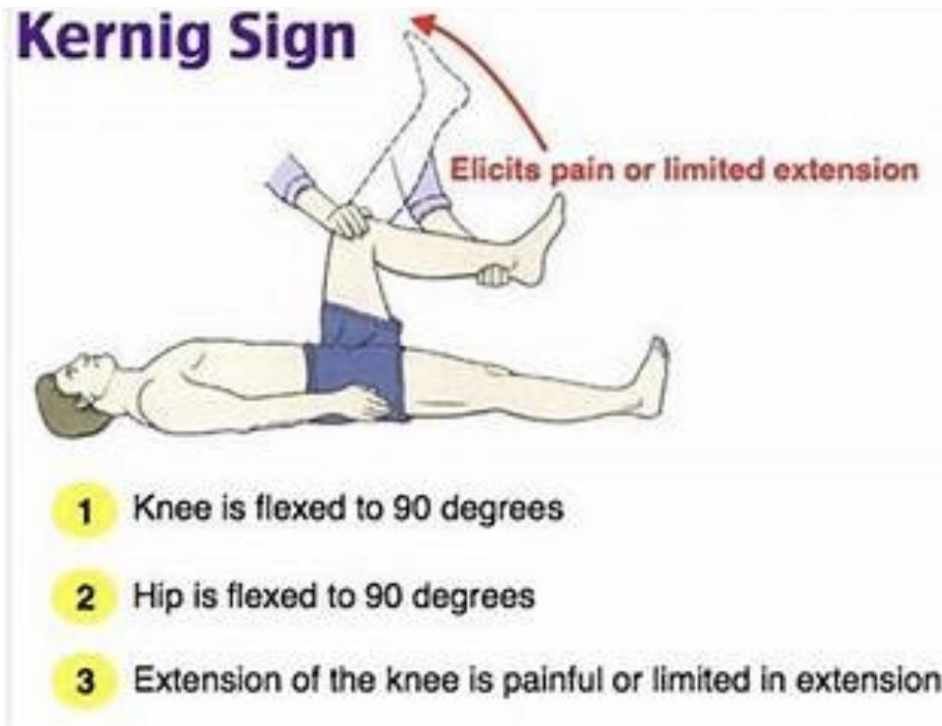
[1] NEJM 2004; 351: 1849

[2] Lancet ID 2016; 16: 339

[3] Ann Intern Med 1998; 129: 862

Clinical manifestations of bacterial meningitis

- Sensitivity of nuchal rigidity = 30% with 68% specificity
- Sensitivity of Kernig and Brudzinski = 5%, though 95% specificity



Question 2

- In patients presenting with suspected acute bacterial meningitis, what is the first diagnostic study that should be performed immediately?
 - *A. Lumbar puncture*
 - *B. Head CT*
 - *C. Blood cultures*
 - *D. Procalcitonin*

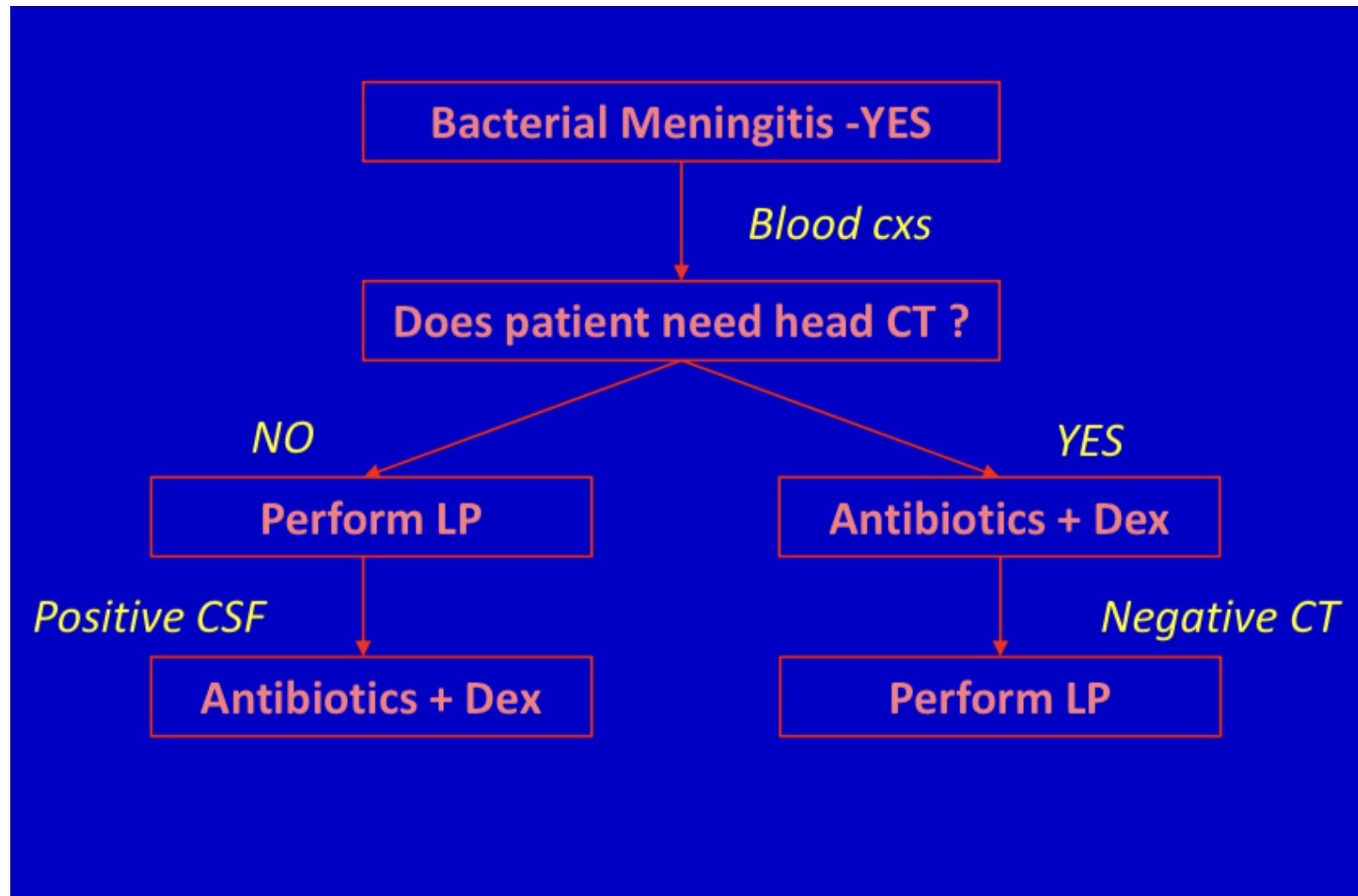
Bacterial Meningitis - Diagnostic Studies

- Blood cultures
 - Obtain 2 sets STAT
 - Positive in 50-90%
- Lumbar puncture
 - Cell count & diff, glucose, protein, GS, culture
 - Do not order CSF (*S. pneumo*, *N. meningitidis*) antigen tests
 - Bacterial vs Viral: when in doubt – save CSF
- * Who needs a head CT prior to LP
 - Immunocompromise
 - Hx of CNS disease
 - New seizure
 - Papilledema
 - ALOC
 - Focal neuro deficit

Question 3

- 50 y/o M homeless M with hx of EtOH abuse, presents to ED with fevers and altered mental status. Cannot obtain further hx. Exam – T 39°C, stiff neck, obtunded, withdraws to noxious stimuli. Blood cxs obtained. What is the next best step in management?
 - *A. Start antibiotics*
 - *B. Head CT*
 - *C. Lumbar puncture*
 - *D. Check EtOH level*

Bacterial Meningitis – Management algorithm



Bacterial Meningitis - Microbiology

- *Streptococcus pneumoniae*
 - GPC in pairs
 - Most common cause
- *Neisseria meningitidis*
 - GNC in pairs
 - Epidemics, students
 - Respiratory droplet isolation
- *Haemophilus influenzae*
 - GNR
- *Listeria monocytogenes*
 - GPR
 - Neonates, age > 50, immunocompromised host

Question 4

- 56 y/o M presents to ED with 1 day of fevers, generalized myalgias and malaise. PE: T 36.8°C, P67, BP 156/90. Oriented only to name, neck supple, midline abdominal scar. Labs: WBC 17.8 (65%N 23%B), + CSF: 1650 WBC 80% neutrophils, G 10, P 380, GS GPCs in pairs. Which of the following is the best treatment for this patient?
 - *A. Vanco + Ceftriaxone*
 - *B. Vanco + Ceftriaxone + Dexamethasone*
 - *C. Vanco + Ceftriaxone + Ampicillin*
 - *D. Vanco + Ceftriaxone + Amp + Dexamethasone*

CSF in bacterial meningitis

- Send CSF for cell count & diff, glucose, protein, GS, culture

	Appearance	Opening Pressure mmHg	WBC (cell/ μ L)	Protein (mg/dl)	Glucose (mg/dL)
Normal	Clear	90-180	< 8	15-45	50-80
Bacterial Meningitis	Turbid	Elevated	>1000-2000	>200	<40

- High probability if any of the following:
 - WBC >2000 or ANC >1180
 - Protein >220
 - Glucose <35

Bacterial Meningitis - Antibiotics

- Antibiotics (within 1-2 hours)
 - Vancomycin 15 to 20 mg/kg/dose q8 to 12 hours initially; consider loading dose; trough 15-20
 - Ceftriaxone: 2gm q12
 - * Ampicillin: 2gm q4 (if risk for Listeria)
- Dexamethasone
 - Suspected or proven pneumococcal meningitis
 - CSF: cloudy/pus, GS - GPC, CSF WBC > 1000
 - Dexamethasone 0.15mg/kg (or 10 mg) q6h x2-4 days
 - Do not give AFTER antibiotics administered

Bacterial Meningitis Summary

- Clinical: (2 of 4) fever, HA, neck stiffness, AMS
- Microbiology:
 - *S.pneumo*, *N.meningitidis*, *H.flu*
 - Listeria (neonates, age > 50, immunocompromised host)
- Diagnostics:
 - Blood cultures first
 - Needs Head CT → treat first
 - LP (WBC > 1000, 80% neutrophils, G <40, P >200)
- Treatment:
 - Dexamethasone first (classic presentation or CSF criteria)
 - Vanco + Ceftriaxone (+ Ampicillin if concern for listeria)

Question 5

- 47 y/o F brought in by family for 3 day history of fevers and chills, then developed aphasia. No significant PMH. PE: T 39.2°C, P112, BP 102/68. Confused, garbled speech. No neck stiffness, moving all extremities. No rash. Suffers a generalized seizure in the ED. LP: 92 WBC (95% lymphs), 156 RBC, 77 G, 118 P, + xanthochromia. MR brain: Increased T2 and FLAIR signal intensity bilateral mesial temporal lobes. Which of the following is the best treatment for this patient?
 - *A. Vanco + Ceftriaxone + Dexamethasone*
 - *B. IV acyclovir*
 - *C. IV ganciclovir*
 - *D. IV amphotericin*
 - *E. INH + RIF + PZA + EMB*

HSV encephalitis

- Clinical
 - Fever (90%); acute onset (< 1 week)
 - AMS, temporal lobe symptoms, seizure
- Microbiology
 - HSV1 >> HSV2
 - Reactivation >> 1° infection
- Diagnostics
 - CSF HSV PCR 95+% sensitive
 - PCR can be negative if early
 - MR > CT sensitivity
 - 90% abnormal, 60% unilateral
- CSF in HSV encephalitis
 - CSF WBC 5-500 lymphocyte predominant
 - Glucose normal
 - CSF-serum G ratio > 0.5
 - Protein normal to elevated
- Treatment IV acyclovir 10mg/kg q8h
 - Start empiric therapy immediately
 - Best outcome with trmt within 24 hrs
 - Mortality 70% → 15% (with trmt)

Question 6

- 54 y/o F presents with a 4 day history of HA. Started as left temporal throbbing and progressed to involve her entire head and radiating down the spine. Denies fevers. Mosquito bite 1 week ago. Hx of meningitis 2 years ago. Born in Mexico. PE: AF P72 BP 133/57, A&Ox3, neck supple, PERRL, neuro exam normal, no rash. LP: 702 WBC (96%L), G45, P77. What is the most likely etiology for this patient's meningitis?
 - A. *HSV*
 - B. *West Nile Virus*
 - C. *Enterovirus*
 - D. *Tuberculosis*

HSV meningitis

- Clinical
 - Primary genital HSV
 - Recurrent – lasts 2-7d, recurrence weeks-years
- Diagnosis
 - CSF: 10-1000 WBCs (N → L), nml G, slight elev P
 - HSV PCR, HSV-2 >> HSV-1
- Management
 - Immunocompromised - IV/PO acyclovir
 - Immunocompetent - treatment controversial
 - Primary genital HSV treatment ↓ risk of meningitis
 - Prophylaxis for recurrent meningitis not recommended

Question 7

- 45 y/o M with hx of MVA and right tibial fracture s/p ORIF 6 months ago – recovered. Developed progressive swelling, erythema and pain in the right lower tibial region 3 days PTA. Denies antecedent trauma. Pain became so severe he could not walk. PE: T 38.8°C P 134 BP 131/60. Severe distress due to pain. RLE with extensive erythema, black necrotic patch on anterior shin, small area draining pus. Labs: WBC 29 (92% N). What is the next best step in management?
 - *A. Consult Surgery*
 - *B. Start antibiotics*
 - *C. Obtain CT of the RLE*
 - *D. Obtain Venous Duplex of RLE*

Necrotizing STI Clinical Manifestations

- Systemic toxicity
 - SIRS typically with high fever
 - Rapid progression (hours to days)
 - Organ dysfunction: MS changes, ARF
- Cutaneous findings
 - Erythema without sharp margins
 - Exquisite pain, pain beyond area of erythema; pain out of proportion to exam
 - Severe induration, ecchymoses, anesthesia, bullae (hemorrhagic/turbid), gangrene, crepitus
 - Most commonly involves the extremities (lower > upper); Fournier gangrene (perineal involvement); head and neck

Question 8

- 50 y/o homeless M presents to the ED with fever and RLE pain. He is unable to provide any history due to altered mental status. On examination – febrile to 39°C, RLE with erythema and hemorrhagic bullae, tender to palpation. Labs: WBC 30, Na 127. Surgery coming to evaluate the patient. Which of the following is the best antibiotic regimen for this patient?
 - *A. Vancomycin*
 - *B. Vancomycin + Cefazolin*
 - *C. Vancomycin + Zosyn*
 - *D. Vancomycin + Zosyn + Clindamycin*

Necrotizing STI microbiology

- Monomicrobial (type 2)

- Group A strep
- Staph aureus
- Vibrio

- Polymicrobial (Type 1)

- Bowel / perianal
- Genital

Necrotizing STI evaluation and management

- Diagnosis

- Surgical diagnosis
- Laboratory: blood cultures
 - Laboratory risk indicator for necrotizing STI
 - WBC, Hb, Na, Cr, Glucose, CRP
- Imaging (optional): CT to evaluate for gas/abscess

- Management

- Surgical debridement
- Empiric:
 - Vanco → MRSA
 - Carbapenem or Zosyn → GNRs & anaerobes
 - Clinda – antitoxin properties

Necrotizing STI summary

- Clinical
 - SIRS parameters
 - Pain / toxicity out of proportion to exam findings
- Microbiology
 - Monomicrobial: GAS, Staph aureus
 - Polymicrobial: GNRs & anaerobes
- Diagnostics
 - Clinical suspicion → consult Surgery
- Treatment
 - Surgical debridement
 - Empiric: Vanco + Zosyn + clinda, then de-escalate to specific therapy