ID Emergencies

BUMC-P
Internal Medicine
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

Clinical Case #1

- 54M presents to ED with 1 day history of fevers, generalized myalgias and malaise. He went to Urgent Care and was referred to the ED as he appeared toxic. Lethargic and slow to respond in ED.
- PE: T 36.8^{0}C P67 BP 156/90 RR 16
  - Oriented only to name, neck supple, PERRL, midline abdominal scar.

What Next?

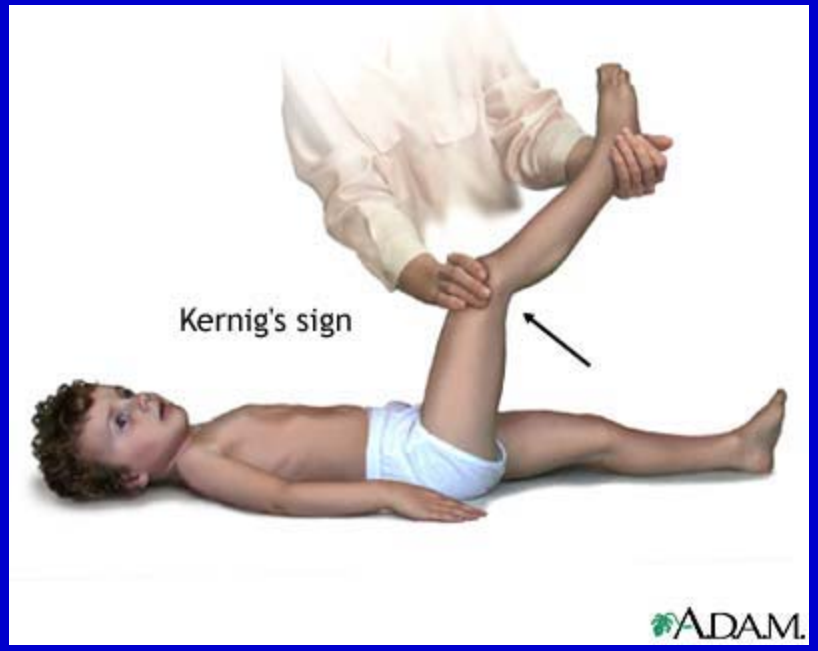
- Should we be concerned about meningitis?
  - *How reliable are symptoms?*
  - *How reliable are exam findings?*

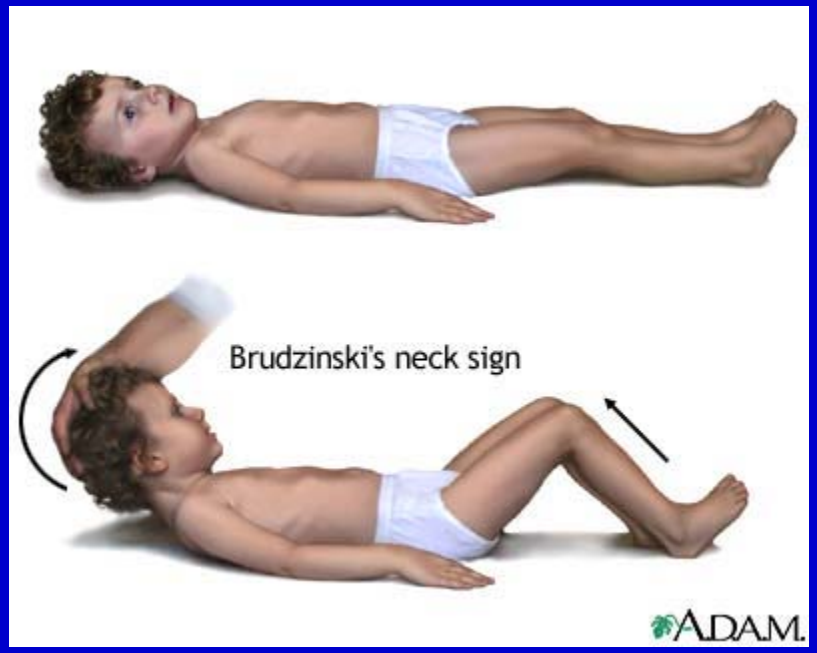
  - *What studies must be done immediately?*
  - *What studies can be delayed?*

Bacterial Meningitis
Clinical Manifestations

Classic triad: fever, nuchal rigidity and altered mental status 40%
95% will have 2 of 4: HA, fever, stiff neck, and altered mental status [1]

Sensitivity of nuchal rigidity for identifying meningitis = 30%
Sensitivity of Kernig's or Brudzinski's sign = 5% each [2]





[1] NEJM 2004; 351:1849
[2] CID 2002; 35:46

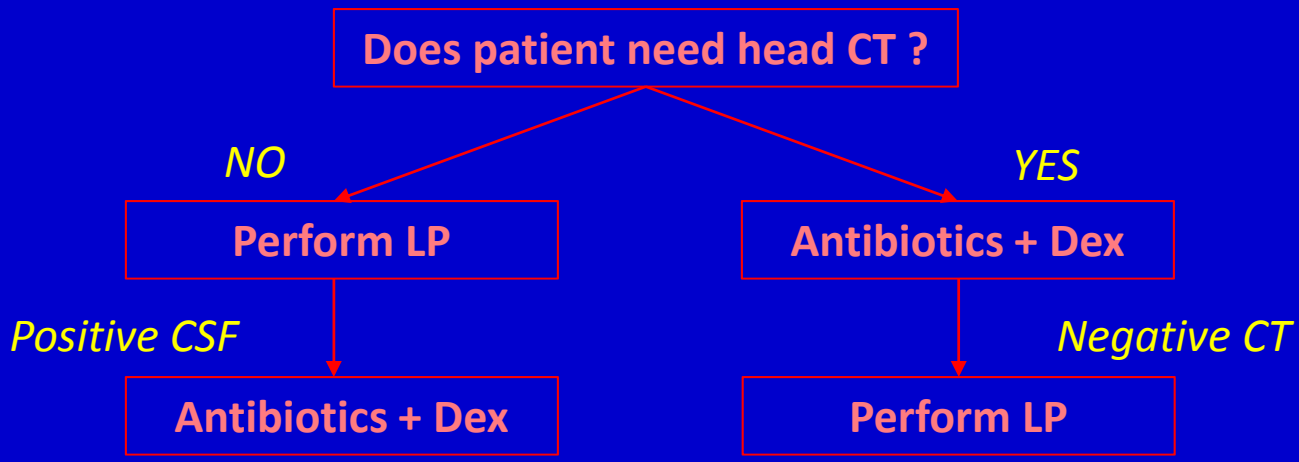
Bacterial Meningitis Diagnostic Studies

- 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
- Head CT
  - Immunocompromise, hx CNS disease, new seizure, papilledema, ALOC, focal neuro deficit [3]

[3] NEJM 2001; 345:1727

What Next?

- Should we be concerned about meningitis?
  - YES → obtain blood cultures



  - *Which antibiotics to start?*
    - *What bugs do I need to cover?*
  - *When to use dexamethasone?*

Bacterial Meningitis Clinical 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

Bacterial Meningitis Management

- Antibiotics
  - Vancomycin: 20mg/kg load, 15mg/kg q12, trough 15-20
  - Ceftriaxone: 2gm q12
  - Ampicillin: 2gm q4
- Dexamethasone
  - Suspected or proven pneumococcal meningitis
  - CSF criteria: cloudy/purulent, GS with GPC, CSF WBC > 1000 [4]
  - Dexamethasone 0.15mg/kg PO q6h x2-4 days
  - Do not give AFTER antibiotics administered

[4] NEJM 2002; 347:1549

Clinical Case #1

Blood cultures: GPCs

WBC 17.8 65%N 23%B

Howell-Jolly bodies

CSF: 75W 80%N

G 1

P 485

GS GPCs in pairs

CSF in Bacterial meningitis

CSF WBC > 1000
Neutrophil % > 80%
Glucose < 40 mg/dL
CSF-serum G ratio 0.4
Protein > 200 mg/dL
CSF lactate > 35mg/dL

Bacterial Meningitis Summary

- Clinical: (2 of 4) fever, HA, neck stiffness, AMS
- Microbiology:
  - *S.pneumo, N.meningitidis, H.flu*
  - *Listeria* (Age > 50, immunocompromised host)
- Diagnostics:
  - Blood cultures first
  - Needs Head CT → treat first
  - LP (WBC > 1000, 80%N, G <40 or ratio 0.4, P > 200)
- Treatment:
  - Dexamethasone first (classic presentation or CSF criteria)
  - Vanco + Ceftriaxone (+ Ampicillin if Listeria).

Question

50M homeless man, EtOH abuse, presents to the ED with fever and altered mental status. He is unable to provide any history. On examination – febrile to 39 C, obtunded, does not open eyes or withdraw to painful stimulus, + neck stiffness. What is the next best step in management?

A – Head CT

B – Perform LP

C – Obtain blood cultures

D – Administer vanco, ceftriaxone and dexamethasone

E – Check blood EtOH level

Clinical Case #2

- 47F presents to ED for 3 day history of fevers and chills. Subsequently developed aphasia and brought in by family. No significant PMH.
- PE: T 39.2^{0}C P112 BP 102/68 RR 14
  - Confused, garbled speech. No neck stiffness, could not cooperate with neuro exam but grossly OK.
  - No rash or skin lesions.
- Subsequently, develops generalized seizure.

What Next?

- Is this meningitis or encephalitis?
  - *How to distinguish clinically?*
  - *Does the distinction matter?*
  - *What diagnostic studies to consider?*
  - *Should I start empiric treatment?*

Clinical Case #2

- CSF: 92 W 95%L
  156 R
  77 G
  118 P

CSF in HSV encephalitis

CSF WBC 5-500
Lymphocyte predominant
Glucose normal
CSF-serum G ratio > 0.5
Protein normal to elevated

- MR Brain: Increased T2 and FLAIR signal intensity bilateral mesial temporal lobes.

HSV Encephalitis

- Diagnosis
  - CSF HSV PCR 95+% sensitive [5]
  - Repeat PCR if 1st negative and high pre-test prob
  - MR > CT. 90% abnormal, 60% unilateral [6]
- Management
  - IV acyclovir 10mg/kg q8h
  - Start with empiric therapy, do not wait for PCR

[5] CID 2008; 47:303-27
[6] CID 2002; 35:254-60

HSV Encephalitis Summary

- Clinical
  - Fever (90%). Acute onset (< 1 week). [7]
  - AMS, temporal lobe symptoms, seizure [7]
- Microbiology
  - HSV1 >> HSV2; reactivation >> 1^0 infection
- Diagnostics
  - CSF HSV PCR, may be negative if LP < 72h of symptoms
- Treatment
  - IV acyclovir if any suspicion

[7] Heart Lung 1998; 27:209-12.

Clinical Case #3

- 33M with hx of MVA and bilateral tibial fractures s/p ORIF 4 months ago – recovered, walking. Developed progressive swelling, erythema and pain in the right lower tibial region 3d PTA. Denies antecedent trauma. Pain became so severe he could not walk.
- PE: T38.8^{0}C P134 BP131/60
  - Severe distress due to pain. A&O x3.
  - RLE with extensive erythema, black necrotic patch on anterior shin, small area draining pus.

Clinical Case #3

- WBC 29.5 92%N
- Lactic acid 1.6
- Cr normal
- CT RLE:

Thickening of the skin with edema in the SQ soft tissues. No clear abscess or soft tissue gas. Comminuted proximal tibial fracture with IM rod and locking screws.

What Next?

- Is this necrotizing fasciitis?
  - *Terminology*
  - *When to consider necrotizing soft tissue infection?*

Necrotizing STI
Clinical Manifestations

- Systemic toxicity
  - SIRS typically with high fever
  - Rapid progression (hours to days)
  - Organ dysfunction: MS changes, ARF
- Cutaneous findings
  - Exquisite pain, pain beyond area of erythema
  - Severe induration, ecchymoses, anesthesia, bullae (hemorrhagic/turbid), gangrene, crepitus

[8] CID 2014; 59:10-52

Necrotizing STI Microbiology

- Monomicrobial (Type 2)
  - Group A Strep
  - Staph aureus
  - Vibrio
- Polymicrobial (Type 1)
  - Bowel / perianal
  - Genital

Necrotizing STI
Diagnosis and Management

- Diagnosis
  - Surgical diagnosis
  - Laboratory: blood cultures
    - Laboratory risk indicator for necrotizing STI [8]
    - WBC, Hb, Na, Cr, Glucose, CRP – sensitive but not specific
  - Imaging (*optional*): CT to evaluate for gas/abscess
- Management
  - Surgical debridement
  - Empiric[9]: Vanco → MRSA
    Zosyn → GNRs & anaerobes

[8] Crit Care Med 2004; 32:1535-41
[9] CID 2014; 59:10-52

Clinical Case #3

- Operative findings:
  - Necrotic skin with underlying necrotic SQ tissue down to tibia.
- Operative cultures:
  - GPC in pairs → *switch vanco + zosyn to…*
- Pathology:
  - Marked soft tissue necrosis and acute inflammation.

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, then de-escalate to specific therapy

Question

50M homeless man 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. He is allergic to PCN – documented rash on prior ED visit. In addition to vancomycin, which is the best antibiotic regimen for this patient?

A – Zosyn + Clinda

B – Cefepime + Clinda

C – Cefepime + Metronidazole + Clind

D – Cipro + Clinda

E – Meropenem + Clinda

Take Home Points

- *Bacterial meningitis*
  - ? Dexamethasone, Vanco + Ceftriaxone (+/- Ampicillin)
- *HSV Encephalitis*
  - Acyclovir, HSV CSF PCR, save the rest of the CSF
- *Necrotizing STI*
  - Call Surgery, Vanco + Zosyn
- *ID Consultation*
  - Leonor Echevarria, Justin Seroy, Kumara Singaravelu, Edwin Yu
  - New Consults: check on call schedule
  - Old Consults: look at last note