

ID Emergencies

BUMC-P

Internal Medicine

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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 36.8⁰C 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?*

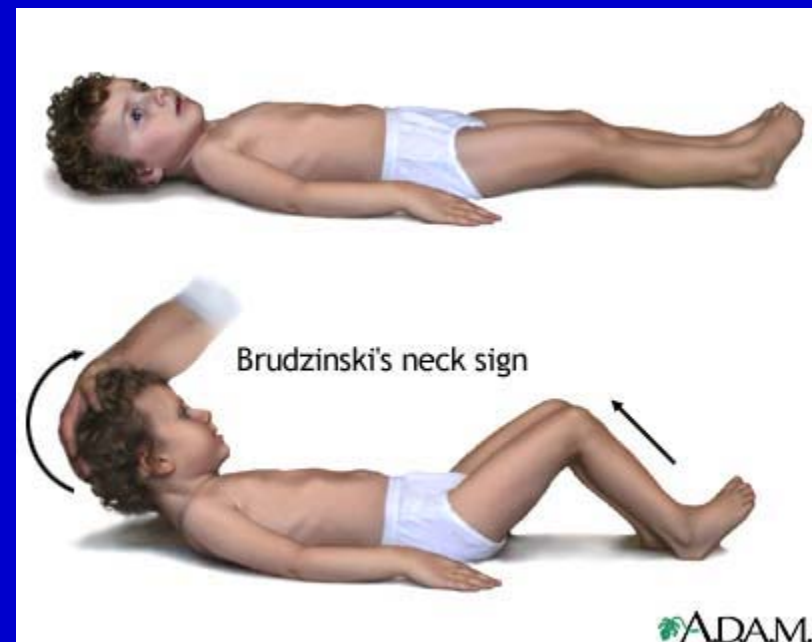
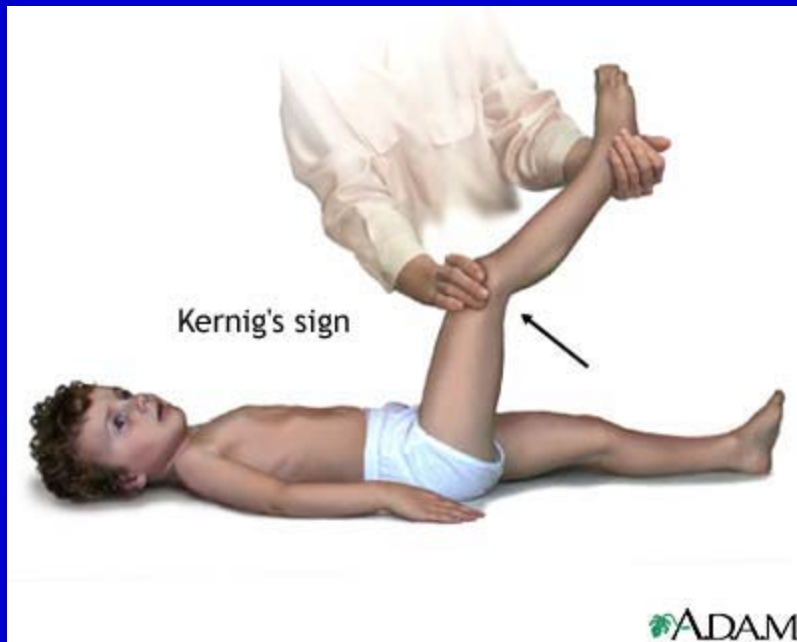
Bacterial Meningitis

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

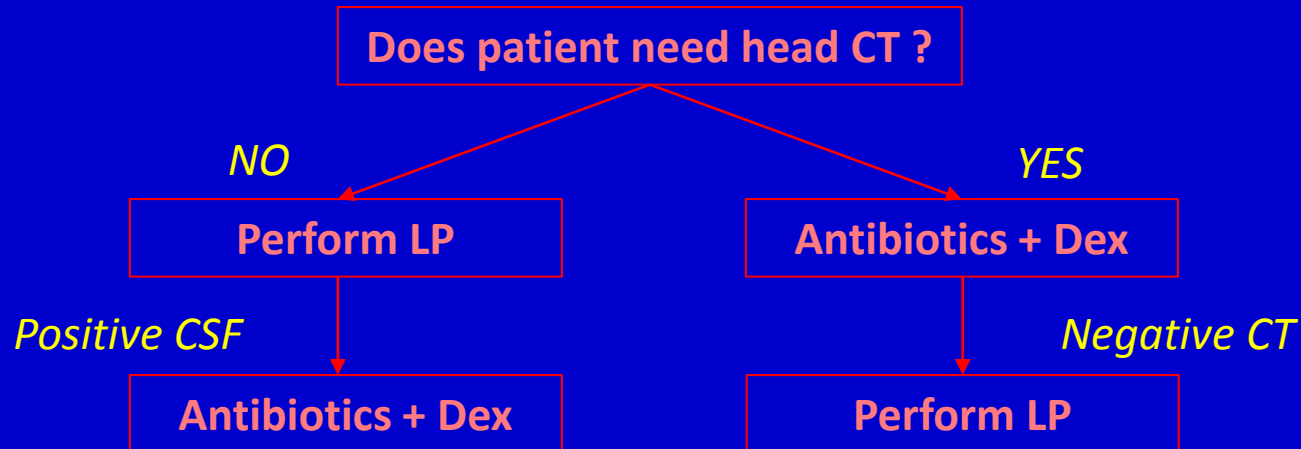
Bacterial Meningitis

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]

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

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*).

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 39.2⁰C 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^o 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: T38.8⁰C 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

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
- Empiric⁹:

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

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
- *Please consult ID*
 - Leonor Echevarria, Justin Seroy, Kumara Singaravelu, Edwin Yu
 - New Consults: check on call schedule
 - Old Consults: look at last note