


Midnight Madness
Crazy psychologist in the ED
late at night

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Teaching points to be addressed

- When should a CNS infection be considered in the differential diagnosis?
- What is optimal timing of imaging, procedures, and therapy?
- What empiric therapy should be given?
- What adjunctive therapy should be administered?

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Case Presentation

- 53-year-old school psychologist had flu symptoms and headache for most of day
- Participated in evening choir practice
- Went to bed early not feeling well
- Awakened confused; could not recognize partner
- EMS called; transported to ED

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Past Medical History & Social History

- No details available
- School psychologist
- No chronic medications
- History of “sinus surgery” years ago
- History supplied by partner

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Physical Exam


- VS: 38.3, 149/palp, 108, 18, sat 97%
- Somnolent / confused
- Few words uttered “Farfalla” (?)
- “Uncooperative” with examination
- Pulmonary, cardiac, abdomen: Normal
- No cutaneous abnormalities
- Localized painful stimuli, spontaneous eye opening and movements
- Context of the moment....

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Your Differential Diagnosis?


Differential Diagnosis

- Neurologic
 - Meningitis
 - Encephalitis
- Other infectious etiologies
 - Sepsis
- Metabolic
- Endocrine
- Toxicologic

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Pragmatic Differential Diagnosis

- Acute Bacterial Meningitis
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ED Course

- What should be done and in what order?

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ED Course-what occurred

- Verify A,B,C's
- IV access, labs, blood cultures
- Empiric antibiotic therapy-ceftriaxone
- Immediate noncontrast cranial CT

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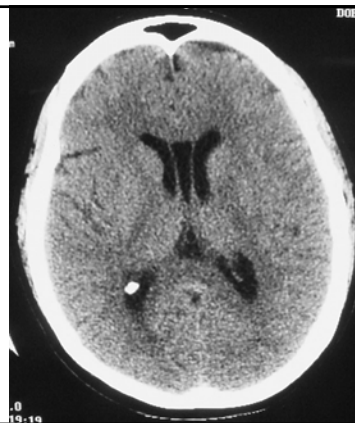
Non-contrast Cranial CT

- Midline structures appear normal



Non-contrast Cranial CT

- Ventricular System appears normal
- No midline shift
- No gross abnormalities



ED Course

- Lumbar puncture in presence of partner

Lumbar puncture

- Slightly cloudy fluid to inspection
- 16,000 WBC (99% segs)
- Glucose <10 Protein 522
- Lactic acid 10.9
- Gram stain - no bacteria

Lab Results

- WBC = 18.5
- Hct = 42
- Platelets = 203
- Chemistry = wnl

ED Course

- What is the next step in this patient's management?

Case course

- Patient given ceftriaxone (before CT), vancomycin, and acyclovir
- ICU admission -
- Blood cultures +4 *S. pneumoniae*
- Continued ceftriaxone and vancomycin
- Culture- sensitive to ceftriaxone
- Discharged day 7 continue OP therapy




Case course

- ENT referral
- Pansinusitis on CT
- Endoscope-encephalocele from earlier surgery
- Elective surgical repair
- Return to work - functional

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Farfalla
Butterfly---
Italian

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Risk Factors


- Bacterial meningitis may occur in adult
- Identified risk factors
 - Diabetes mellitus
 - Otitis media
 - Pneumonia
 - Sinusitis
 - Alcohol abuse

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Pattern of Presentation-Triad

- Fever, neck stiffness, altered mental status
- Fever-high sensitivity, low specificity
 - Sens 85%; spec 45%
- Neck stiffness 70% pooled sensitivity
- Altered mental status-67% pooled sensitivity
- Triad is imperfect to detect meningitis by this pooled retrospective analysis

• Attia J, Hatala R, Cook DJ, Wong JG: Does this adult patient have meningitis? JAMA 1999; 282:175.

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Neck Stiffness

- Kernig's sign - knee extension / response
- Brudzinski's sign-neck flexion / response
- Nuchal rigidity "stiff neck" on exam
- Prospective study, "...these diagnostic tools are too insensitive to identify the majority of patients with meningitis in contemporary practice...."

• Thomas KE, Hasbun R, Jekel J, Quagliarello VJ: The diagnostic accuracy of Kernig's sign, Brudzinski's sign, and nuchal rigidity in patients in adults with suspected meningitis. Clin In Dis 2002;35:46.

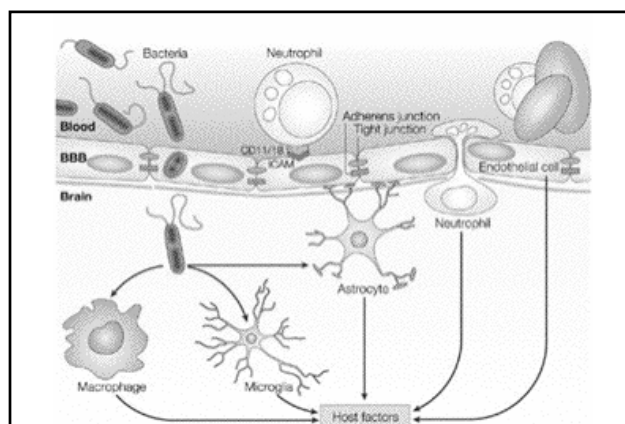
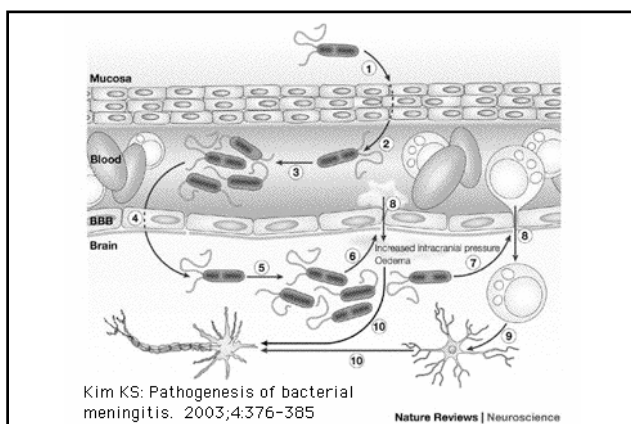
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A new sign?

- Jolt accentuation of headache...
- Patient turns head horizontally
- 2-3 rotations / second
- Does headache get worse?
- **One study...**
- Attia J, Hatala R, Cook DJ, Wong JG: Does this adult patient have meningitis? JAMA 1999; 282:175.
- Uchiyama T, Tsukagoshi H. Jolt accentuation of headache: the most sensitive sign of CSF pleocytosis. Headache 1991;31:167.

Anatomy and Pathophysiology

- Vicious cycle of pathophysiology
 - Bacteremia
 - Meningeal inflammation
 - Blood-brain barrier breach
 - Inflammatory responses within brain with neuronal injury
 - Vasculitis
 - Cerebral edema



Organisms

- | | |
|-----------------------|---|
| • < 3 months | • <i>E.coli, Listeria, Streptococci</i> |
| • 3 months - 18 years | • <i>N. meningitidis, H. influenzae, S. pneumoniae</i> |
| • 18 years - 50 years | • <i>N. meningitidis, S. pneumoniae</i> |
| • > 50 years | • <i>S. pneumoniae, Listeria, gram-negative bacilli</i> |

Complications-*S. pneumoniae*

- Increased cerebral pressure from edema
- Seizures
- Stroke syndromes
- Intracranial hemorrhage

Lab studies

- CBC, chemistries
- Coagulation studies?
- Blood cultures
- Other cultures as appropriate

Procedures

- Lumbar puncture
 - Neutrophilic predominance in bacterial meningitis
 - Low glucose, high protein

CT before LP?

- Alternative diagnoses?
- Mass lesion?

- Do not delay therapy in high-suspicion cases for imaging....

Emergency Department Care

- Prompt recognition
- Prompt intervention
 - Diagnostic
 - Therapeutic-do not delay pending diagnostic interventions in high-suspicion cases
 - Antibiotics-multiple
 - Anti-inflammatory-steroids

Antibiotics

- | | |
|-----------------------|---|
| • < 3 months | • Ampicillin, third-generation cephalosporin |
| • 3 months - 18 years | • Third-generation cephalosporin (ceftriaxone) + vancomycin |
| • 18 years - 50 years | • Third-generation cephalosporin (ceftriaxone) + vancomycin |
| • > 50 years | • Ampicillin, third-generation cephalosporin, vancomycin |

Anti-inflammatory medications

- Dexamethasone - 10 mg IV at or before (15-20 minutes) antibiotics...
- 10 mg q 6h for 4 days
- Adults...
- Pediatrics?

De Gans J, van de Beek D, et al: Dexamethasone in adults with bacterial meningitis. NEJM 2002;347:1549.


Consultations

- Will depend upon institution
- Ill patients - ICU admission
- Infectious disease, neurology, or others might be helpful

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Summary

- Acute bacterial meningitis may be a life or function-limiting event
- Acute intervention may limit morbidity and mortality
- Antibiotics-broad, multiple
- Anti-inflammatory agent-dexamethasone recommended at this time

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Teaching points

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Teaching points

- When should a CNS infection be considered in the differential diagnosis?
- Altered behavior, altered consciousness, fever, or seizures may suggest presence of a CNS infection

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Teaching points

- What is optimal timing of imaging, procedures, and therapy?
- Do not delay therapy-antibiotics-for imaging or procedures in patients with high probability of bacterial meningitis

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Teaching points

- What empiric therapy should be given?
- Empiric therapy should include antibiotics for likely organisms based on age....in adults, third generation cephalosporin and vancomycin should constitute initial therapy

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Teaching points

- What adjunctive therapy should be administered?
- Steroids are back....

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Questions???

FERNE www.ferne.org

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