

ER-INF Combined Conference

Date: 2011/06/16
Reporter: R3 林逸婷
Instructor: VS 翁健瑞

Patient's Profile

- 74 y/o Female
- Date: 2012/06/XX,, 14:40
- E4V5M6
- T: 37.8 C, HR: 114 bpm, RR: 16 bpm, BP: 170/85 mmHg, SpO2: 96%
- Triage II

Chief Complaint

- 眩暈/頭暈跌倒右眼角撕裂傷
- Vertigo since this morning.

Present Illness

- Vomiting (+)
 - tandem gait unsteady
 - Diplopia (-)
 - Chills, fever?
-
- She was diagnosed as AOM at our ENT OPD last week
 - Headache, vertigo, nausea, emesis for 1 week
 - Very weak and stayed on the bed every day
- Past Hx: hypertension, peptic ulcer

Physical Examinations

- Con's: clear, E4V5M6
- Neck: supple
- Chest: clear BS, RHB
- Abdomen: sofe
- Pelvis: intact
- Extremities: warm
- No nystagmus.
- F-N-F: intact
- EOM: intact

Tentative Diagnosis

- Vertigo
- H.I with facial L/W

Order 6/8 14:56

- CBC/DC/Plt
- Panel
- PT, aPTT
- F/S (182)
- VBG3
- B/C x I
- EKG
- N/S 60ml/hr
- Brain CT w/o contrast
- U/A
- Vena 1 amp iv st

ECG



VBG3

- PH=7.484
- PCO2=38.2 mmHg
- PO2=46 mmHg
- BE=5 mmol/L
- HCO3=28.7 mmol/L
- TCO2=30 mmol/L
- SO2=85 %

Brain CT



Available Lab Data 6/8

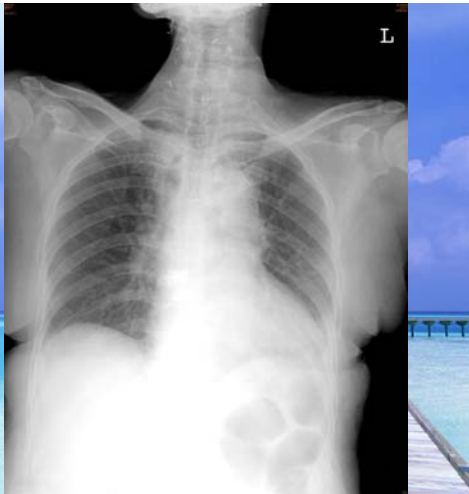
CBC/DC		PT/aPTT		Biochemistry	
WBC (x10 ⁹ /uL)	22.1	PTp	11.3	GLU (mg/dL)	178
RBC (x10 ⁶ /uL)	4.10	PTc	10.5	GOT (U/L)	18
Hb (g/dL)	11.5	PT (INR)	1.08	BUN (mg/dL)	20
HCT (%)	34.6	PTTp	26.1	Cr (mg/dL)	1.1
MCV (fL)	84.4	PTTc	32.8	Na (meq/L)	129
MCH (Pg)	28.0			K (meq/L)	4.3
MCHC (g/dL)	33.2				
PLT (x10 ⁹ /uL)	458				
Neut (%)	96.9			CRP (mg/dL)	4.170
Lymph (%)	1.4				
Mono (%)	1.7				
Eosin (%)	0				
Baso (%)	0				

Order(2) 6/8 14:56

- U/C
- 單導
- B/C x I
- Lactate (9.6 mg/dL)
- Cefmetazole 1 g iv st
- CXR
- 啟動sepsis

檢驗項目名稱	檢驗值	檢驗值單位
Sediment	*****	
RBC	3-5	/HPF
WBC	1-2	/HPF
Epithelial cell	1-2	/HPF
Cast	Hyaline	/LPF
.cast-amount	+	
Crystal	Not Found	/HPF
.Cry-amount	-	
Bacteria	+/-	
Others	Not Found	

CXR



17:52 consult INF

Consultation Notes:

Dear doctor:

The 75 y/o female patient is a patient with HTN. She ever suffered from dizziness and diagnosed as VBI at our Neuro OPD. Right otorrhea and otalgia was noted for a period of time with pus discharge and she came to our ENT OPD on 5/28 and 6/4 and AOM was impressed. Recurrent vomiting was noted recently and she was brought to our ER on 6/8. We were consulted for evaluation.

PE: poor response
mild neck stiffness?
bilateral breath sounds clear
soft abdomen

Lab: WBC: 22100 S: 96 B: 0 Crea: 1.1 CRP: nil U/A: no pyuria

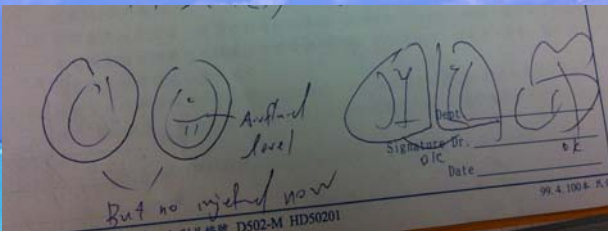
Imp: Leukocytosis, cause?

Suggest:

1. May use empiric antibiotic with Ceftriaxone 2g iv Q12h.
 2. Wait culture report. May check CRP. Consult ENT. May arrange lumbar puncture if no contraindication.
- Thanks a lot.

18:47 consult ENT

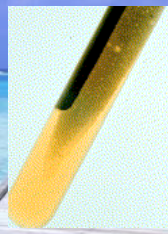
- V/S: 38.3/133/20, BP: 198/121



- Imp: left MEE

Lumbar Puncture

- Indication: r/o meningitis
- Open pressure: > 66 cm H₂O (3根量不夠)
- Close pressure: 40 cm H₂O
- Appearance: cloudy



	Normal	Bacterial	Viral	Fungal/TB
Pressure (cmH ₂ O)	5-20	> 30	Normal or mildly increased	Fibrin web
Appearance	Normal	Turbid	Clear	
Protein (g/L)	0.18-0.45	> 1	< 1	0.1-0.5
Glucose (mmol/L)	2.5-3.5	< 2.2	Normal	1.6-2.5
Gram stain	Normal	60-90% Positive	Normal	
Glucose - CSF:Serum Ratio	0.6	< 0.4	> 0.6	< 0.4
WCC	< 3	> 500	< 1000	100-500
Other		90% PMN	Monocytes 10% have >90% PMN 30% have >50% PMN	Monocytes

檢驗項目名稱	檢驗值	檢驗值單位	檢驗項目名稱	檢驗值	檢驗值單位	最小參考值	最大參考值	H,L,Lo值
CSF	*****		Glucose	<2	mg/dL	40.000	70.000	*L
Color	Yellow		Total-protein	410.0	mg/dL	15.000	45.000	*H
Appearance	Cloudy		Latex Crypt Ag: Negative					
Pandy's test	3+		Indian ink exam: Negative					
RBC	2430	x10/9ul	CSF GRAM'S STAIN:					
WBC	12960	x10/9ul	Moderate WBC					
L:N	1%-99%		Amount Few					
			G(-) bacillus were found					
			ACID- FAST STAIN: Negative					

Lumbar Puncture

Table 168-4 Typical Spinal Fluid Results for Meningeal Processes

Parameter (Normal)	Bacterial	Viral	Neoplastic	Fungal
Opening pressure (<170 mm cerebrospinal fluid)	>300 mm	<300 mm	200 mm	300 mm
White blood cell count (<5 mononuclear)	>1000/mm ³	<1000/mm ³	<500/mm ³	<500/mm ³
% Polymorphonuclear cells (0)	>80%	1%-50%	1%-50%	1%-50%
Glucose (>40 milligrams/dL)	<40 milligrams/dL	>40 milligrams/dL	<40 milligrams/dL	<40 milligrams/dL
Protein (<50 milligrams/dL)	>200 milligrams/dL	<200 milligrams/dL	>200 milligrams/dL	>200 milligrams/dL
Gram stain (-)	+	-	-	-
Cytology (-)	-	-	+	+

Reproduced with permission from Fitch M: Emergency department management of meningitis and encephalitis. *Infect Dis Clin North Am* 22: 33, 2008.

- ## Order(3)
- Dexamethasone 1 amp iv q6h
 - Vancomycin 1 g iv st then 500mg q8h
 - Ampicillin 2 g iv q4h
 - Ceftriaxone 2g iv q12h
 - Mannitol 75 cc iv st
 - GCS q2h
 - 待ICU
 - Admitted to MICU

- ## Culture
- 6/1 pus culture: *Klebsiella pneumoniae*
 - 6/10 B/C: *Klebsiella pneumoniae*
 - 6/12 CSF culture: *Klebsiella pneumoniae*
 - Final Diagnosis: *K.p meningitis*

Discussion

Bacterial Meningitis

- ## Epidemiology
- US: *S. pneumoniae* (61%), *N. meningitidis* (16%), group B streptococcus (14%), *H. influenzae* (7%), and *Listeria* (2%).
 - Taiwan:
 - *Klebsiella pneumoniae* (25.5%, 42/165)
 - *Acinetobacter meningitis* (11.5%, 19/165), *Pseudomonas*.
 - staphylococcal infection (23%, 38/165), of which 76% (29/38) were methicillin-resistant strains.
- Changing epidemiology of adult bacterial meningitis in southern taiwan: a hospital-based study. - Infection. 2008 Feb;36(1):15-22. Epub 2008 Jan 12.

Risk Factors

- Acute or chronic otitis media
- Sinusitis
- Immunosuppression/ splenectomy
- Alcoholism
- Pneumonia
- Diabetes mellitus
- Cerebrospinal fluid leak
- Endocarditis
- Neurosurgical procedure/head injury
- Indwelling neurosurgical device/cochlear implant
- Advanced age
- Malignancies
- Liver disease
- Unvaccinated to *Haemophilus influenzae* type b, *Neisseria meningitidis*, or *Streptococcus pneumoniae*

Clinical Features

- fever, neck stiffness, headache, and altered mental status/ seizure/ cranial nerve palsies
- *absence of fever, neck stiffness, and altered mental status does not exclude meningitis in adults*
- Brudzinski sign and Kernig sign
- skin purpura of meningococemia, streptococemia, or rickettsial infection
- Examine fundi for papilledema or absence of venous pulsation

Accuracy of physical signs for detecting meningitis

- 190 patients (ages 13-81 years) CSF analysis identified meningitis in 99 (52%) patients.
- No physical sign of meningeal irritation could accurately distinguish those with and without meningitis:
 - nuchal rigidity (LR+ 1.33 (0.89, 1.98) and LR- 0.86 (0.70, 1.06))
 - head jolt accentuation of headache (LR+ 5.52 (0.67, 44.9) and LR- 0.95(0.89, 1.00))
 - Kernig's sign (LR+ 1.84 (0.77, 4.35) and LR- 0.93(0.84, 1.03))
 - Brudzinski's sign (LR+ 1.69 (0.65, 4.37) and LR- 0.95 (0.87, 1.04)).

Clin Neurol Neurosurg. 2010 Nov;112(9):752-7. Epub 2010 Jul 7.

CT Scan before Lumbar Puncture?

Table 168-3 Some Suggested Criteria for Obtaining Head CT before Lumbar Puncture for Suspected Meningitis

Altered mental status or deteriorating level of consciousness ²⁸
Focal neurologic deficit
Seizure
Papilledema
Immunocompromised state
Malignancy
History of focal central nervous system disease (stroke, focal infection, tumor)
Concern for mass central nervous system lesion
Age >60 y ⁷

Glucocorticoids

- Dexamethasone before or at the time of the first antibiotic dose effectively reduces the morbidity due to *H. influenzae* type b in children.
- In adults, dexamethasone appears to cut in half both the morbidity and mortality of meningitis due to *S. pneumoniae*.
- Dosage: 0.15 milligram/kg in children and 10 milligrams in adults **Q6h for 4 days, before and with first dose of antibiotics**

Adjunctive dexamethasone in bacterial meningitis: a meta-analysis of individual patient data.

van de Beek D, Farrar JJ, de Gans J, Mai NT, Molynieux EM, Peltola H, Peto TE, Roine J, Scarborough M, Schultz G, Thwaites GE, Tuan PQ, Zetserman AI¹

Department of Neurology, Centre of Infection and Immunity Amsterdam, Academic Medical Center, Amsterdam, Netherlands.

Abstract

BACKGROUND: Dexamethasone improves outcome for some patients with bacterial meningitis, but not others. We aimed to identify which patients are most likely to benefit from dexamethasone treatment.

METHODS: We did a meta-analysis of individual patient data from the randomised, double-blind, placebo-controlled trials of dexamethasone for bacterial meningitis in patients of all ages for which raw data were available. The pre-determined outcome measures were death at the time of first follow-up, death or severe neurological sequelae at 1 month follow-up, death or any neurological sequelae at first follow-up, and death or severe bilateral hearing loss at first follow-up. Combined odds ratios (ORs) and tests for heterogeneity were calculated using conventional Mantel-Haenszel statistics. We also did exploratory analysis of hearing loss among survivors and other exploratory subgroup analyses by use of logistic regression.

FINDINGS: Data from 2029 patients from five trials were included in the analysis (833 [41.0%] aged <15 years). HIV infection was confirmed or likely in 580 (28.6%) patients and bacterial meningitis was confirmed in 1639 (80.8%). Dexamethasone was not associated with a significant reduction in death (270 of 1019 [26.5%] on dexamethasone vs 275 of 1010 [27.2%] on placebo, OR 0.97, 95% CI 0.79-1.19), death or severe neurological sequelae or bilateral severe deafness (42.3%vs 44.3%, 0.92, 0.76-1.11), death or any neurological sequelae or any hearing loss (54.2%vs 57.4%, 0.89, 0.74-1.07), or death or severe bilateral hearing loss (36.4%vs 38.9%, 0.89, 0.73-1.09). However, dexamethasone seemed to reduce hearing loss among survivors (24.1%vs 29.5%, 0.77, 0.60-0.99, p=0.04). Dexamethasone had no effect in any of the prespecified subgroups, including specific causative organisms, pre-dexamethasone antibiotic treatment, HIV status, or age. Pooling of the mortality data with those of all other published trials did not significantly change the results.

INTERPRETATION: Adjunctive dexamethasone in the treatment of acute bacterial meningitis does not seem to significantly reduce death or neurological disability. There were no significant treatment effects in any of the prespecified subgroups. The benefit of adjunctive dexamethasone for all or any subgroup of patients with bacterial meningitis thus remains unproven.

Corticosteroids for acute bacterial meningitis.

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Department of Neurology, Center for Infection and Immunity Amsterdam (CIINA), Academic Medical Center University of Amsterdam, P.O. Box 22700, Amsterdam, Netherlands, 1100 ZG.

Abstract

BACKGROUND: In experimental studies, the outcome of bacterial meningitis has been related to the severity of inflammation in the subarachnoid space. Corticosteroids reduce this inflammatory response.

OBJECTIVES: To examine the effect of adjuvant corticosteroid therapy versus placebo on mortality, hearing loss and neurological sequelae in people of all ages with acute bacterial meningitis.

SEARCH STRATEGY: We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2010, issue 1), MEDLINE (1996 to February 2010), EMBASE (1974 to February 2010) and Current Contents (2001 to February 2010).

SELECTION CRITERIA: Randomised controlled trials (RCTs) of corticosteroids for acute bacterial meningitis.

DATA COLLECTION AND ANALYSIS: We scored RCTs for methodological quality. We collected outcomes and adverse effects. We performed subgroup analyses for children and adults, causative organisms, low-income versus high-income countries, time of steroid administration and study quality.

MAIN RESULTS: Twenty-four studies involving 4041 participants were included. Similar numbers of participants died in the corticosteroid and placebo groups (18.0% versus 20.0%, risk ratio (RR) 0.92, 95% confidence interval (CI) 0.82 to 1.04, P = 0.18). There was a trend towards lower mortality in adults receiving corticosteroids (RR 0.74, 95% CI 0.53 to 1.05, P = 0.09). Corticosteroids were associated with lower rates of severe hearing loss (RR 0.67, 95% CI 0.51 to 0.88), any hearing loss (RR 0.76, 95% CI 0.64 to 0.89) and neurological sequelae (RR 0.83, 95% CI 0.69 to 1.00). Subgroup analyses for causative organisms showed that corticosteroids reduced severe hearing loss in *Haemophilus influenzae* meningitis (RR 0.34, 95% CI 0.20 to 0.59) and reduced mortality in *Streptococcus pneumoniae* meningitis (RR 0.84, 95% CI 0.72 to 0.98). In high-income countries, corticosteroids reduced severe hearing loss (RR 0.51, 95% CI 0.35 to 0.73), any hearing loss (RR 0.58, 95% CI 0.45 to 0.73) and short-term neurological sequelae (RR 0.64, 95% CI 0.48 to 0.85). There was no beneficial effect of corticosteroid therapy in low-income countries. Subgroup analysis for study quality showed no effect of corticosteroids on severe hearing loss in high quality studies. Corticosteroid treatment was associated with an increase in recurrent fever (RR 1.27, 95% CI 1.09 to 1.47), but not with other adverse events.

AUTHORS' CONCLUSIONS: Corticosteroids significantly reduced hearing loss and neurological sequelae, but did not reduce overall mortality. Data support the use of corticosteroids in patients with bacterial meningitis in high-income countries. We found no beneficial effect in low-income countries.

- Significant prognostic factors:
 - appropriate antibiotic therapy
 - the presence of septic shock
 - disseminated intravascular coagulation
 - high cerebrospinal fluid protein levels and white blood cell counts.
- Initial empiric therapy:
 - a third generation cephalosporin should be considered for community-acquired meningitis
 - such as carbapenems should be considered for patients with postneurosurgical meningitis.

Klebsiella meningitis in adults: clinical features, prognostic factors and therapeutic outcomes.
J Clin Neurosci. 2002 Sep;9(5):533-8.

Otogenic Meningitis

- **Extracranial and intracranial complications of otitis media** Acta Otolaryngol. 2012 Mar;132(3):261-5. Epub 2012 Jan 8.

- Intracranial: meningitis, brain abscess, sigmoid sinus involvement, extradural abscess, subdural abscess, and hydrocephalus
- Extracranial: labyrinthitis, mastoid abscess, facial paralysis, Bezold abscess, and apicitis pyramidalis

- **Surgical management** Ear Nose Throat J. 2006 Jan;85(1):36-9.

- Modified radical mastoidectomy;
- tympanomastoidectomy; and myringotomy.

Thanks.