Infection & ER combine meeting

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Discussion

- Meningitis
- Lemierre's syndrome
- Sphenoid sinusitis

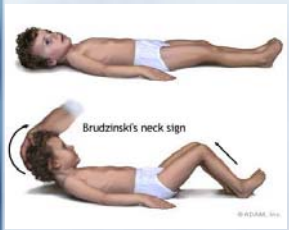
Meningitis

- Inflammatory disease of the leptomeninges.
- Bacterial meningitis

Organism	Site of entry	Age range	Predisposing conditions
Neisseria meningitidis	Nasopharynx	All ages	Usually none, rarely complement deficiency
Streptococcus pneumoniae	Nasopharynx, direct extension across skull fracture, or from contiguous or distant foci of infection	All ages	All conditions that predispose to pneumococcal bacteremia, fracture of cribriform plate
Listeria monocytogenes	Gastrointestinal tract, placenta	Elderly adults and neonates	Defects in cell-mediated immunity; pregnancy; liver disease, alcoholism, malignancy
Coagulase-negative staphylococcus	Dermal or foreign body	All ages	Surgery and foreign body, especially ventricular drains
Staphylococcus aureus	Bacteremia, dermal, or foreign body	All ages	Endocarditis, surgery and foreign body, especially ventricular drains
Gram-negative bacilli	Various	Elderly adults and neonates	Advanced medical illness, neurosurgery, ventricular drains, decreased stomach acidity
Haemophilus influenzae	Nasopharynx, contiguous spread from local infection	Adults rare, but infants and children if not vaccinated	Diminished humoral immunity

- Viral meningitis : Entero-, HSV, VZV, Arbo-
- Fungal and parasitic meningitis ：Cryptococcus

Brudzinski's and Kernig's sign



Condition	Appearance	Pressure	WBC/mm³	Glu(mg/dl)	TP(mg/dl)
N			0~5 lymph	50~75	15~40
B			100~10000 polys	<45	100~1000
T			<500 lymph	<45	100~200
F			<300 lymph	<45	40~300
A			<300 poly ➔ lymph	50~100	50~100

檢驗項目名稱	檢驗值	檢驗值單位
CSF	**********	
Color	Colorless	
Appearance	Clear	
Pandy's test	Negative	
RBC	1	x10/9ul
WBC	4	x10/9ul
L:N	4:0	

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Diagnostics

Accuracy of the cerebrospinal fluid results to differentiate bacterial from non bacterial meningitis, in case of negative gram-stained smear

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Table 2 Comparison between BM and NBM on biological variables

Variables	NBM (n = 133)	BM (n = 18)
Blood biological results		
Blood leukocyte count (/mm^3)	8.9 (7.9-9.5)	10.6 (4.9-14.4)
C-reactive protein (mg/L) (n = 112)	13 (9-17)	162 (39-275)*
Procalcitonin (ng/mL)	0.07 (0-0.08) (n = 55)	3.75 (0.1-6.16) (n = 8)*
CSF results		
White blood cell count (/mm^3)	98 (70-127)	494 (204-1300)*
Neutrophils (%)	37% (17-54)	80% (60-92)*
Absolute neutrophil count (/mm^3)	20 (13-29)	428 (16-700)*
Protein (g/L)	0.75 (0.65-0.8)	2.45 (0.7-3.7)*
CSF/blood glucose	0.54 (0.52-0.56)	0.36 (0.16-0.48)*

Data are median (95% CI) or n (%).
* $P < .05$ vs NBM.

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Table 3 Comparison of the efficiency of the emergency physician and various biological results

	Sensitivity	Specificity	PPV	NPV	PLR	NLR	Accuracy
Emergency physician	0.89	0.77	0.31	0.96	3.86	0.14	0.79
CSF leukocyte count	0.50*	0.94	0.53	0.94	8.33*	0.53	0.71
% CSF leukocyte	0.78	0.75	0.30	0.96	3.12	0.29	0.71
CSF/blood glucose ratio	0.33*	0.42*	0.07	0.82	0.57*	1.60*	0.11*
CSF protein	0.63*	0.94	0.58	0.96	10.50*	0.39	0.75
Serum CRP	0.78	0.74	0.28	0.96	3.00	0.30	0.75
Serum PCT	0.87	1.00*	1.00*	0.99	>100*	0.23	0.99*

PPV indicates positive predictive value; NPV, negative predictive value; PLR, positive likelihood ratio; NLR, negative likelihood ratio.
* $P < .05$ vs emergency physician; the threshold value for each variable was determined by the ROC curve (Table 4).

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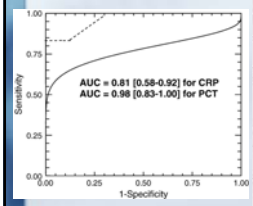

Table 4 Threshold values for each variable determined by the AUC

Variables	AUC (95% CI)	Best threshold value
Leukocyte count (/mm^3)	0.59 (0.21-0.82)*†	300
Leukocyte (%)	0.79 (0.47-0.92)†	75
CSF/blood glucose ratio	0.11 (0.06-0.18)*†	0.15
CSF protein (g/L)	0.70 (0.30-0.89)*†	1.31
Serum CRP (mg/L)	0.81 (0.58-0.92)†	22
Serum PCT (ng/mL)	0.98 (0.83-1.00)*	2.13

AUCs are reported as value (95% CI).
* $P < .05$ vs CRP.
† $P < .05$ vs PCT.

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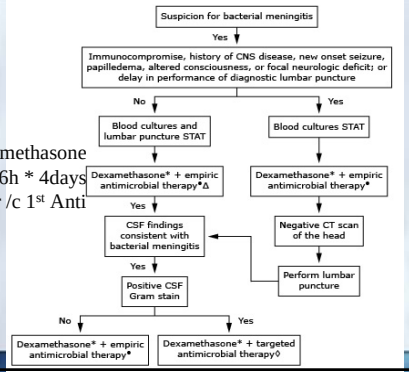
Treatment of meningitis

Dexamethasone 10mg iv q6h * 4days before or /c 1st Anti



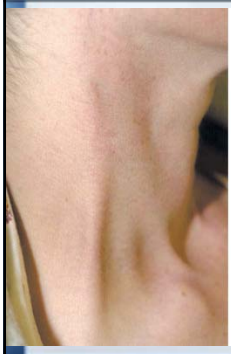
Treatment of meningitis

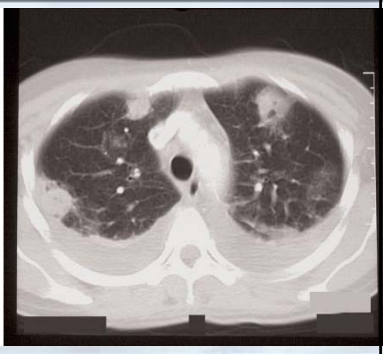
	Bacteria pathogens	Antimicrobial therapy
<1 month	*S. agalactiae*, *E. coli*, *Listeria monocytogenes*, *Klebsiella*	Ampicillin + cefotaxime
1-23 months	*S. pneumoniae*, *N. meningitidis*, *S. agalactiae*, *H.influenzae*, *E. coli*	Vancomycin + 3rd cepha
2-50 years	*N. meningitidis*, *S. pneumoniae*	Vancomycin + 3rd cepha
>50 years	*S. pneumoniae*, *N. meningitidis*, *L. monocytogenes*, aerobic GNB	Vancomycin + 3rd cepha + Ampicillin
Head trauma Postneurosurgery	*S. pneumoniae*, *H. influenzae*, *S. aureus*, GNB(*P. aeruginosa)*	Vancomycin + cefepime or ceftazidime
Immuno-compromised	*S. pneumoniae*, *N. meningitidis*, *L. monocytogenes* , GNB	Vancomycin plus ampicillin plus cefepime

Lemierre's syndrome

- A form of thrombophlebitis usually caused by the bacterium *Fusobacterium necrophorum*.
- Usually affects young, healthy adults.
- After a sore throat caused by some bacterium of the Streptococcus genus, has created a peritonsillar abscess
- Deep in the abscess, anaerobic bacteria like Fusobacterium necrophorum can flourish.

Lemierre's syndrome





Signs and symptoms

- Sore throat, fever, and general body weakness
- Extreme lethargy, spiked fevers, rigors, swollen cervical lymph nodes and a swollen, tender or painful neck.

Pathophysiology

- An infection of the head and neck region. Usually this infection is a pharyngitis but it can also be initiated by an otitis, a mastoiditis, a sinusitis or a parotitis.
- *F. necrophorum* colonizes the infection site and the infection spreads to the parapharyngeal space.
- Spread to the internal jugular vein.
- Bacteria cause the formation of a thrombus containing these bacteria➔ Thrombophlebitis

Diagnosis

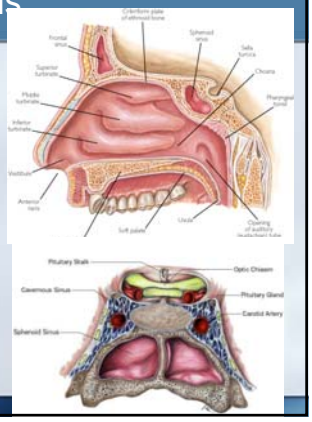
- Elevation of CRP, ESR, WBC
- Thrombosis of the internal jugular vein can be displayed with sonography. However, thrombi that have developed recently have low echogenicity and thus will not show up on ultrasound.
- A CT scan or an MRI scan is more sensitive in displaying the thrombus.

Treatment and Prognosis

- Beta-lactam antibiotics, metronidazole, clindamycin and third generation cephalosporins
- If antibiotic therapy does not improve ➔drain any abscesses and/or perform ligation of the internal jugular vein
- The mortality of Lemierre's syndrome is when diagnosed about 4.6%

Sphenoid sinusitis

- Inflammatory response involving mucous membranes of the nasal cavity and paranasal sinuses
- Acute < 4 weeks
  Subacute 4~12 weeks
  Chronic >12 weeks



Sphenoid sinusitis

- Pansinusitis：33%
  Isolated sphenoid sinusitis：2.7%
- Maxillary ：*S. pneumoniae, H. influenzae,* and *M. catarrhalis*
  Sphenoid：*S. aureus, S. pneumoniae*
- Blockage of sinus ostia and impaired mucociliary clearance ➔ stasis and secondary bacterial infection

Presentation

- Headache： vertex, retroorbital, parioccipital, or frontal. Severe, interfering with sleep, and not relieved by narcotics
- Fever and purulent rhinorrhea
- Hypoesthesia of the trigeminal nerve
- Chemosis, proptosis, ptosis, diplopia, or decreased visual acuity and ophthalmoplegia may be noted.
- 78% of cases of sphenoid sinusitis were initially misdiagnosed.

Workup

- Laboratory
  Leukocytosis with a left shift suggest
  Perform a lumbar puncture if meningitis is suggested.
- Imaging
  CT scan
  MRI
  MRA can be used to confirm the diagnosis of cavernous sinus thrombosis.

Treatment

- Medical Therapy
  Try medical treatment for 24 hours. If the patient does not improve over this time course, schedule surgical therapy
- Surgical Therapy
  The goals of surgery are to identify the sphenoid ostium, enlarge it, and establish drainage. Diseased mucosa should be removed and cultures should be obtained.

Take home message

- Headache
  Relief by lain down ?
  Headache of meningitis ?
- Differential of Bacterial and aseptic meningitis
- Brain CT 除了看 brain 之外， 記得看其他部位，如 bony structure 、 sinus 、retral orbital area...

- Thanks