

COMMUNITY ACQUIRED-BACTERIAL MENINGITIS IN ADULTS

Verajit Chotmongkol and Chawalit Techoruangwiwat

Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand

Abstract. We reviewed the charts of all patients ≥ 15 years of age or older in whom community acquired-bacterial meningitis was diagnosed at Srinagarind Hospital, Khon Kaen, Thailand from 1984 through 1998. Eighty-five patients were included in this study. The clinical manifestation was acute meningitis with CSF neutrophilic pleocytosis and low glucose content. Gram's staining of CSF was positive in 79%. The most common pathogens were *Streptococcus pneumoniae* (28%) and *Escherichia coli* (14%) respectively. The overall mortality was 34%.

INTRODUCTION

Bacterial meningitis still remains a serious disease. Most previously published studies have reported from the Western countries. To our knowledge, it has never been reported in Thailand. This report reviewed our experience in community acquired-bacterial meningitis in adults in Srinagarind Hospital, Khon Kaen, Thailand.

MATERIALS AND METHODS

The charts of all patients 15 years of age or older in whom community acquired-bacterial meningitis was diagnosed at Srinagarind Hospital from 1984 through 1998 were reviewed. The criteria for diagnosis of bacterial meningitis was based on (1) a compatible clinical picture and a positive cerebrospinal fluid (CSF) culture, or (2) a compatible clinical picture and one of the following: a positive CSF antigen test, a positive blood culture and a positive Gram's staining of CSF with a negative CSF culture.

RESULTS

There were 112 patients who were diagnosed as community acquired-bacterial meningitis but 85 patients were compatible with the criteria, of which 63 patients conformed to criteria (1). The clinical manifestations were demonstrated in Table 1. Most of them presented with acute meningitis. Only 4 patients presented with subacute meningitis (> 7 days) in which the causative organism was *Burkholderia pseudomallei* (1 case) and *E. coli* (1 case). In the other 2 cases, the etiologic organism could not be identified. Of 2 patients with ophthalmoplegia, 1 patient presented with bilateral 3rd, 4th

and 6th cranial nerve involvement and the other presented with unilateral 6th cranial nerve palsy. In the patient with deafness, the causative organism was Group B *Streptococcus*. In the patients with hemiparesis, cerebral infarction was the pathologic mechanism, which resulted from vasculitis in 2 cases and bacterial endocarditis in 1 case.

As shown in Table 2, a mean of white blood cell count of the CSF was about 5,000 cell/mm³,

Table 1
Symptoms and signs.

Age, years	
Mean	42.11±19.17
Range	15-88
Sex (male), <i>n</i>	62 (73%)
Fever, <i>n</i>	75 (88%)
Duration of fever, days	
Mean	3.20±2.49
Range	1-17
Headache, <i>n</i>	65 (76%)
Duration of headache, days	
Mean	3.20±2.59
Range	1-17
Stiffneck, <i>n</i>	72 (85%)
Mental impairment, <i>n</i>	60 (71%)
Drowsiness, <i>n</i>	16
Confusion, <i>n</i>	18
Stuporous, <i>n</i>	14
Coma, <i>n</i>	12
Convulsion, <i>n</i>	15 (18%)
Focal, <i>n</i>	3
Generalized, <i>n</i>	12
Cranial nerve palsy, <i>n</i>	3 (4%)
Ophthalmoplegia, <i>n</i>	2
Deafness, <i>n</i>	1
Hemiparesis, <i>n</i>	4 (5%)

Table 2
Laboratory results.

Complete blood count	
Hematocrit, %	
Mean	35.61±7.42
Range	12-47
White blood cell, cells/mm ³	
Mean	17,489±8,771.89
Range	1,100-39,800
Polymorphonuclear cell, %	
Mean	81.44±12.53
Range	45-98
Hemoculture	
Positive, <i>n</i>	36 (42%)
CSF examination	
Initial opening pressure	
≥300 mmH ₂ O, <i>n</i>	28 (33%)
<300 mmH ₂ O, <i>n</i>	57 (67%)
White blood cell, cells/mm ³	
Mean	5,144±10,987.87
Range	0-60,000
Polymorphonuclear>50%, <i>n</i>	79 (93%)
Protein content, mg/dl	
Mean	629.3±1,406.67
Range	44-12,000
Glucose ratio (CSF/blood), %	
Mean	38±25.68
Range	2-81
<50%, <i>n</i>	77 (91%)
Gram's staining	
Positive, <i>n</i>	67 (79%)
Culture	
Positive, <i>n</i>	62 (73%)
Bacterial antigen	
Positive, <i>n</i>	6 (13%)
Not done, <i>n</i>	40

with predominant polymorphonuclear leukocytes in 93% of cases. Bacteria were detected with Gram's staining of the CSF in 79% and culture of the CSF was positive in 73%. Six patients had predominant lymphocytic leukocytes: bacterial meningitis was diagnosed from positive CSF culture in 5 cases and in blood culture 1 case. Eight patients had normal glucose level in the CSF and bacterial meningitis was diagnosed by positive CSF culture in 6 cases, by positive blood culture in 4 cases, by positive Gram's staining of the CSF in 3 cases and by positive CSF antigen test in 1 case.

The causative organisms are shown in Table 3 and Fig 1. The most common organism was *S. pneumoniae*, which predominated in all age groups.

Table 3
Causative organisms.

Organism	No. (%)
<i>Streptococcus pneumoniae</i>	24 (28)
<i>Escherichia coli</i>	12 (14)
Non A, B, D <i>Streptococcus</i>	8 (9)
<i>Klebsiella pneumoniae</i>	6 (7)
Group A <i>Streptococcus</i>	5 (6)
<i>Staphylococcus aureus</i>	3 (4)
<i>Burkholderia pseudomallei</i>	2 (2)
<i>Salmonella</i> spp	2 (2)
<i>Neisseria meningitidis</i>	1 (1)
<i>Hemophilus influenzae</i>	1 (1)
<i>Pseudomonas aeruginosa</i>	1 (1)
Group B <i>Streptococcus</i>	1 (1)
Culture-negative	19 (22)
Gram positive cocci	11
Gram negative bacilli	8

E. coli was the second most common organism and the incidence increased in patients older than 45 years. The associated conditions with a relationship to a causative organism are shown in Table 4.

A recurrence of meningitis, defined as meningitis that occurred more than 3 weeks after the

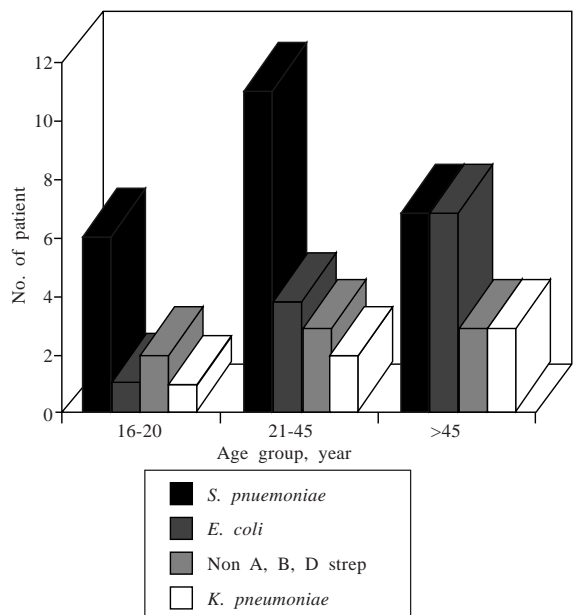


Fig 1—The relative frequency of major bacterial pathogens in each of the 3 age groups.

Table 4
Associated conditions.

Organism*	1	2	3	4	5	6	7	8	9	10	11	12	Total
History of head injury	4			2	1				1		1		9
Steroid	1			3	1		1						6
Otitis media	2		1	1							1		5
Cerebrospinal fluid leakage	1			1	1						1		4
Alcoholism	1			1	1						1		4
Skin infection	1						1		1			1	4
Cytotoxic drugs	1			1		1							3
Cirrhosis	1			1	1								3
Sinusitis	1									1			2
Pneumonia	1			1									2
SLE								1					1
VP-shunt	1												1
Strongyloidiasis				3							1		4

*1: *S. pneumoniae*, 2: *N. meningitidis*, 3: *H. influenzae*, 4: *E. coli*, 5: *K. pneumoniae*, 6: *P. aeruginosa*, 7: *B. pseudomallei*, 8: *Salmonella* spp, 9: Gr A *Streptococcus*, 10: Gr B *Streptococcus*, 11: Non Gr A, B, D *Streptococcus*, 12: *Staphylococcus*.

Table 5
Mortality rates, according to pathogen.

Organism	No.	Deaths, No.	Mortality, %
<i>S. pneumoniae</i>	24	9	37.5
<i>E. coli</i>	12	5	41.6
<i>K. pneumoniae</i>	6	4	66.6
Group A <i>Streptococcus</i>	5	2	40.0
<i>Salmonella</i> spp	2	2	100.0
<i>P. aeruginosa</i>	1	1	100.0
<i>B. pseudomallei</i>	2	1	50.0
Culture-negative	19	2	10.5

completion of therapy, occurred in 4 cases. The causative organism was *S. pneumoniae* and the predisposing factors were CSF rhinorrhea (2 cases), otitis media (1 case) and sinusitis (1 case).

The mortality for the 85 patients was 34% and the mortality rates, according to pathogen, are shown in Table 5.

DISCUSSION

From our study, the clinical manifestations and CSF abnormalities were similar to a recent

previous report (Sigurdardottir *et al*, 1997). *S. pneumoniae* was also the most common organism. The striking finding in this study was the very low incidence of *N. meningitidis* and *L. monocytogenes* which were common etiologic organisms in other reports (Durand *et al*, 1993; Sigurdardottir *et al*, 1997). Furthermore, although the incidence of melioidosis is highest in the northeast part of Thailand where our hospital is located, it was uncommon as a causative organism of bacterial meningitis. Because of the high percentage of positive results of Gram's staining of the CSF, this is still a rapid and very useful technique for initial laboratory assessment.

The mortality from our study was higher than in previous reports, namely approximately 20%. This may reflect differences in socio-economic status, underlying disease and etiologic organisms.

REFERENCES

- Durand ML, Calderwood SB, Weber DJ, *et al*. Acute bacterial meningitis in adults. A review of 493 episodes. *N Engl J Med* 1993; 328: 21-8.
- Sigurdardottir B, Bjornsson OM, Jonsdottir KE, Erlendsdottir H, Gudmundsson S. Acute bacterial meningitis in adults. A 20-year overview. *Arch Intern Med* 1997; 157: 425-30.