

Disseminated Strongyloidiasis and Meningitis: 40-year Experience at a Japanese Academic Medical Center

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Introduction

Strongyloides stercoralis is a nematode, whose prevalence rate is estimated to be 10-40% worldwide, mainly in the Tropics. Although the development of ivermectin increased its survival rate, the mortality was reported to be up to 87% with disseminated strongyloidiasis (DS), when complicated by sepsis, pneumonia, or bacterial meningitis. The study aim was to determine clinical features of DS and bacterial meningitis.

Methods

We reviewed the charts of patients diagnosed with strongyloidiasis and meningitis from 1975 to 2015 at Okinawa Chubu Hospital, the largest teaching hospital in a strongyloidiasis-endemic area in Japan. Patients with concurrent diagnoses of bacterial meningitis and strongyloidiasis (defined as larvae detected from stool, sputum, cerebrospinal fluid (CSF), ascites, gastric juice, or urine) were eligible.

Results

Of 71 cases, 27 were CSF-culture positive (CP); 44 negative (CN). All CN cases exhibited one of the following characteristics of bacterial meningitis: a neutrophil predominance, CSF glucose < 40 mg/dL, or a positive Gram stain result. 51.9% (CP) and 36.4% (CN) cases were associated with systemic strongyloidiasis, defined as the finding of larvae from at least two distinct sites. Mortality was 29.6% (CP) and 20.5% (CN), respectively. Patient characteristics and CSF analysis were similar in both groups. Sepsis was confirmed in 55.6% (CP) and 20.5% (CN) of cases, respectively.

Conclusion

- Meningitis associated with DS was characterized by its causative enteric organisms. Also, the prevalence of purulent, CN cases was higher than previous reports. (Durand, et al. NEJM. 1993)
- Atypical characteristics for community acquired bacterial meningitis were suggestive of latent dissemination in our population. (Kishaba. The Infection. 1982)

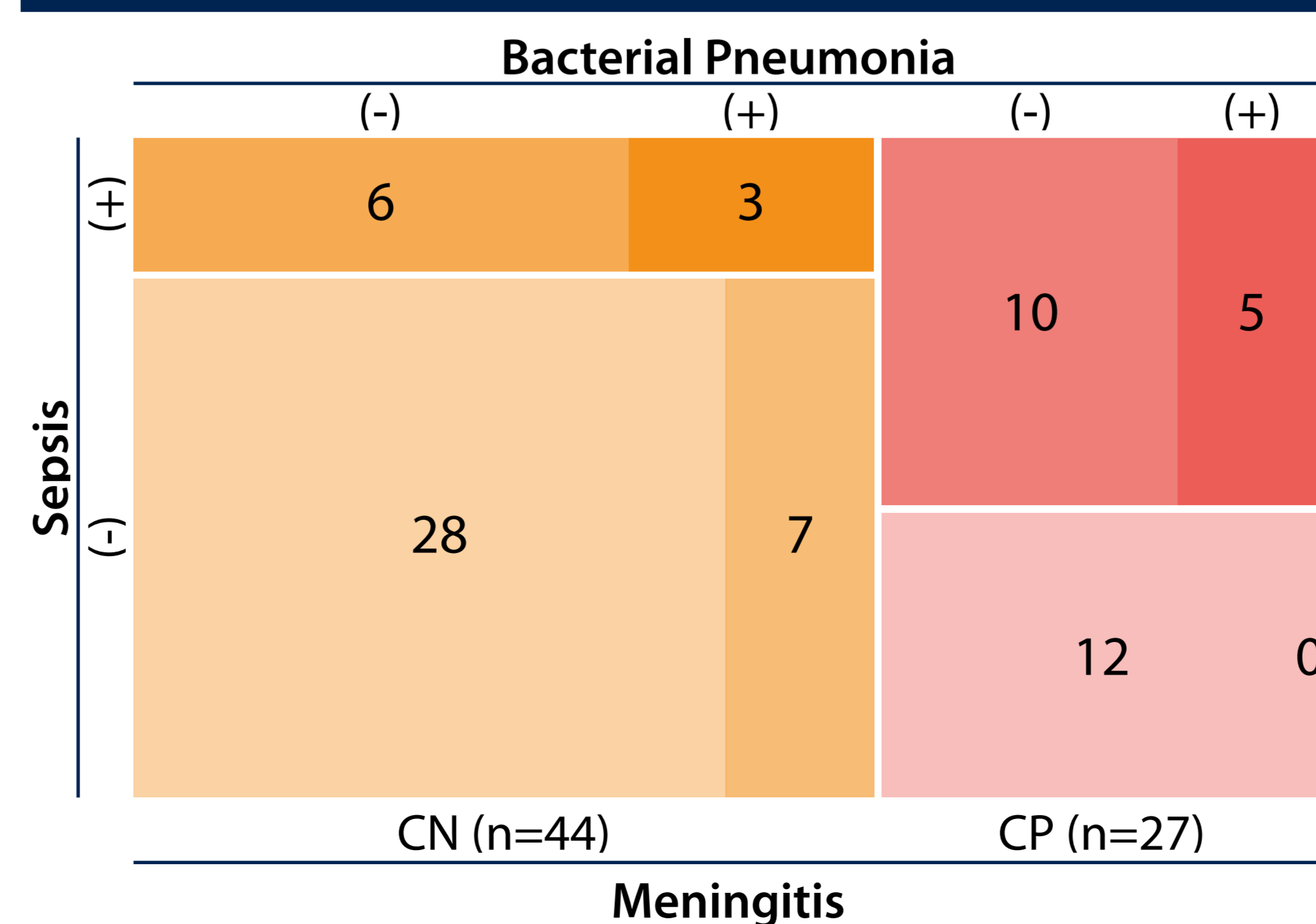
Culture Negative Cases (CN) (n=44) [1A]

Age	Sex	Outcome	Culture Results		Fever	Headache	AMS	Nausea
			Blood	Sputum				
58	M	Green	Enterococcus, S. epidermidis	S. epidermidis, E. coli	Green	Green	Green	Green
67	F	Green	E. coli	E. coli, H. flu, M. catarrhalis	Green	Green	Green	Green
71	M	Green	E. aerogenes	E. aerogenes	Green	Green	Green	Green
79	M	Green	P. aer		Green	Green	Green	Green
66	M	Green	S. gallolyticus		Green	Green	Green	Green
38	M	Green	S. sanguinis		Green	Green	Green	Green
63	F	Green	E. coli		Green	Green	Green	Green
76	M	Green	K. pna		Green	Green	Green	Green
57	F	Green	K. pna		Green	Green	Green	Green
60	M	Green		K. pna, S. aureus, E. coli	Green	Green	Green	Green
82	F	Green		Enterococcus	Green	Green	Green	Green
75	M	Green		E. coli	Green	Green	Green	Green
68	M	Green		K. pna	Green	Green	Green	Green
81	F	Green		S. maltophilia	Green	Green	Green	Green
48	F	Green		P. aer	Green	Green	Green	Green
73	M	Green		P. aer	Green	Green	Green	Green
47	M	Green			Green	Green	Green	Green
38	M	Green			Green	Green	Green	Green
76	M	Green			Green	Green	Green	Green
54	M	Green			Green	Green	Green	Green
52	F	Green			Green	Green	Green	Green
60	F	Green			Green	Green	Green	Green
63	F	Green			Green	Green	Green	Green
54	M	Green			Green	Green	Green	Green
49	M	Green			Green	Green	Green	Green
92	F	Green			Green	Green	Green	Green
56	F	Green			Green	Green	Green	Green
51	F	Green			Green	Green	Green	Green
49	M	Green			Green	Green	Green	Green
52	M	Green			Green	Green	Green	Green
69	F	Green			Green	Green	Green	Green
43	M	Green			Green	Green	Green	Green
43	M	Green			Green	Green	Green	Green
45	M	Green			Green	Green	Green	Green
66	F	Green			Green	Green	Green	Green
46	F	Green			Green	Green	Green	Green
68	M	Green			Green	Green	Green	Green
75	F	Green			Green	Green	Green	Green
49	M	Green			Green	Green	Green	Green
54	F	Green			Green	Green	Green	Green
51	M	Green			Green	Green	Green	Green
36	F	Green			Green	Green	Green	Green
46	M	Green			Green	Green	Green	Green
70	M	Green			Green	Green	Green	Green

Culture Positive Cases (CP) (n=27) [1B]

Age	Sex	Outcome	Culture Results			Fever	Headache	AMS	Nausea
			Blood	CSF	Sputum				
67	M	Green	E. coli	E. coli, P. aer	K. pna, P. aer	Green	Green	Green	Green
64	F	Green	E. coli	E. coli	E. aerogenes	Green	Green	Green	Green
84	F	Green	E. coli	E. coli	E. coli	Green	Green	Green	Green
52	F	Green	K. pna	H. flu	K. pna, MRSA	Green	Green	Green	Green
68	M	Green	PSSP	PRSP	M. catarrhalis	Green	Green	Green	Green
42	M	Green	E. coli	E. coli		Green	Green	Green	Green
25	M	Green	E. coli	K. pna		Green	Green	Green	Green
78	M	Green	P. aer	E. aerogenes		Green	Green	Green	Green
40	F	Green	S. gallolyticus	S. gallolyticus		Green	Green	Green	Green
61	F	Green	P. agglomerans	K. pna, Enterococcus		Green	Green	Green	Green
66	M	Green	S. gallolyticus	S. gallolyticus		Green	Green	Green	Green
67	M	Green	S. infantarius	Strep. spp		Green	Green	Green	Green
64	M	Green	K. pna	K. pna		Green	Green	Green	Green
44	M	Green	S. gallolyticus	S. gallolyticus		Green	Green	Green	Green
46	M	Green	S. gallolyticus, K. pna	S. gallolyticus		Green	Green	Green	Green
83	M	Green	K. pna	K. pna		Green	Green	Green	Green
54	M	Green		E. coli		Green	Green	Green	Green
51	M	Green		E. coli		Green	Green	Green	Green
21	F	Green		E. coli		Green	Green	Green	Green
31	F	Green		E. coli		Green	Green	Green	Green
79	M	Green		K. pna		Green	Green	Green	Green
53	M	Green		S. epidermidis		Green	Green	Green	Green
49	M	Green		S. gallolyticus		Green	Green	Green	Green
53	M	Green		E. coli		Green	Green	Green	Green
49	M	Green		L. monocytogenes		Green	Green	Green	Green
70	M	Green		C. neoformans		Green	Green	Green	Green
29	F	Green		K. pna		Green	Green	Green	Green

Association between Meningitis/Sepsis/Pneumonia [1C]



Clinical and Demographic Characteristics of Included Patients [2]

	Total	CN	CP
Age [year] (median, range)	56 (21-92)	58 (36-92)	53 (21-84)
Sex (#male, %)	45 (63.4%)	26 (59.1%)	19 (70.4%)
Mortality (#dead, %)	17 (23.9%)	9 (20.5%)	8 (29.6%)
Dissemination (#cases, %)	30 (42.3%)	16 (36.4%)	14 (51.9%)
Chief Complaints (#, %)			
Fever	39 (54.9%)	23 (52.3%)	16 (59.3%)
Headache	30 (42.3%)	19 (43.2%)	11 (40.7%)
Altered mental status	18 (25.4%)	10 (22.7%)	8 (29.6%)
Nausea/vomiting	10 (14.1%)	7 (15.9%)	3 (11.1%)
CSF WBC Count (#, %)			
0-99/mm ³	6 (8.5%)	4 (9.1%)	2 (7.4%)
100-4,999/mm ³	48 (67.6%)	33 (75.0%)	15 (55.6%)
5,000-9,999/mm ³	9 (12.7%)	4 (9.1%)	5 (18.5%)
10,000/mm ³ -	6 (8.5%)	2 (4.5%)	4 (14.8%)
CSF Neutrophils (#, %)			
0-19%	2 (2.8%)	1 (2.3%)	1 (3.7%)
20-79%	22 (31.0%)	12 (27.3%)	10 (37.0%)
80%-	45 (63.4%)	30 (68.2%)	15 (55.6%)
CSF Glucose < 40mg/dL (#, %)	34 (47.9%)	21 (47.7%)	13 (48.1%)

Table 1A/B: Description of patients. Red cells indicate fatality, culture positivity, and positive symptoms. Green cells show survival, negative cultures/symptoms. Gray cells are for missing data. AMS: altered mental status.

Table 1C: Association between meningitis, sepsis, and pneumonia (the latter two caused by enteric organisms). Digits indicate the number of cases.

Table 2: Summary of included patients. Symptoms of one patient are missing.

