CSF cell counts & biochemistry in neonatal meningitis: premature reassurance

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BACKGROUND

Group B streptococcus (GBS) remains a major contributor to neonatal sepsis globally.

GBS has been described as the causative pathogen in >50% of neonatal meningitis (1,2).

Confirmed neonatal bacterial meningitis has been described in the setting of relatively normal initial cerebrospinal fluid (CSF) white blood cell counts (WBC) (3).

Initial cell counts are commonly used to guide early clinical management, especially in resource poor settings where culture may not be routinely performed.

Antibiotics are often administered prior to a lumbar puncture being performed, increasing the risk of a “false negative” CSF culture.

We describe CSF parameters in GBS meningitis during a case series of infant GBS disease in Victoria, Australia.

References

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METHODS

Retrospective data collected (2007-2017) from four hospital networks in Victoria, Australia.

Cases were identified using microbiology database extraction then recaptured with International Classification of Diseases (ICD) discharge coding.

Demographic and clinical data were collected from medical records.

Definitions

- EOD = <7 days of life.
- LOGBS = ≥7 days and <6 months of life.
- Proven meningitis = CSF culture positive.

RESULTS

175 infants were identified, accounting for 183 clinical disease episodes.

RESULTS (cont'd)

156 infants (85%) had a CSF performed.

30 infants (20%) had a lumbar puncture (LP) performed prior to first dose of antibiotics.

- 14 infants were clinically treated as meningitis; all had proven meningitis.

Overall the median time between the first dose of antibiotics and LP was 14hr 5min (IQR 23min, 33hr 30min).

- 2hr 19min in LOBGS (IQR 0min, 13hr 35min).
- 19min in proven meningitis (IQR 0min, 7hr 20min).

6 (22%) of 27 infants with proven LOGBS meningitis had <10 x10⁶ WBC in the CSF.

- These infants had a median CRP of 13.5mg/L compared to 57mg/L amongst all proven meningitis cases.

One infant (2%) with proven meningitis had a negative blood culture.

Table 1: Demographics, CSF parameters of proven meningitis cases with low CSF WBC

Case no.	Age at onset (days)	Birth Gest.	Sex	CSF parameters						Antibiotics prior
				Polymorphs (x10 ⁶)	Lymphocytes (x10 ⁶)	RBC (x10 ⁶)	Glucose (mmol/L)	Lactate (mmol/L)	Protein (g/L)	
1	55	40.1	F	4	2	640	-	-	-	No
2	60	35.4	F	0	0	126	5.5	3.3	0.5	Yes
3	23	40.2	M	6	2	3730	0.6	3.5	1	Yes
4	21	38	F	0	2	1	4	-	0.7	Yes
5	26	33.3	M	4	0	19250	3.1	-	0.7	Yes
6	30	39.5	F	0	0	3	3.2	-	0.6	Yes

RBC – Red Blood cells; CSF – cerebrospinal fluid; Birth Gest. – Birth gestation; WBC – white blood cells

CONCLUSIONS

- Most infants received antibiotics prior to LP
- There is a high prevalence (22%) of ‘normal’ CSF cell counts and biochemistry amongst infants with proven LOGBS meningitis.
- These infants had less systemic inflammation compared to other infants with proven meningitis.
- CSF culture is still valuable for at least several hours post antibiotic commencement.