Ventriculitis complicating pyogenic meningitis in neonates

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Ventriculitis was diagnosed in 17 cases of neonatal bacterial meningitis by positive culture and/or leucocytosis of ventricular fluid. Majority of the patients were female (14) and 13 were pre-term. Maternal and/or obstetric complications were present in 82 per cent. Mean age of diagnosis of meningitis was 7.7 ± 5.1 days. In all patients blood and CSF cultures were identical: E. coli (11), group B streptococcus (3), citrobacter-enterobacter (2) and pseudomonas (1). Six received systemic therapy and 11 were administered combined systemic and intraventricular therapy. Overall mortality rate was 23.5 per cent and eight of the 13 survivors were abnormal on follow up. Outcome was related to the duration to render the CSF sterile and to the interval between the diagnosis of meningitis and ventriculitis. The mortality was significantly lower in patients treated with combined systemic and intraventricular therapy.

Key words: Neonatal meningitis; ventriculitis; intraventricular therapy

The mortality and morbidity from neonatal bacterial meningitis remains high. Ventriculitis complicates bacterial meningitis in the neonatal period in the majority of cases. While its presence adversely influences the outcome, management of ventriculitis poses a great problem to the clinician.

The present study was undertaken to determine the factors predisposing to the development of ventriculitis in order to identify the infants at risk; to recognize early clinical and laboratory features useful in diagnosis and to evaluate the treatment regimen used and relate these to the outcome.

Material and Methods

Case records were reviewed of all neonates (0-28 days), diagnosed as having ventriculitis, (positive culture of ventricular CSF and/or cellular reaction: >50 WBC/cmm), who were admitted to the neonatal intensive care unit, Hospital for Sick Children, Toronto, between January 1974 to December 1979. Results of investigations, radiographs, scans, autopsy protocols and histological materials were reviewed and in each the diagnosis was confirmed or verified. Infants with neural tube defects or infected ventriculo-peritoneal shunts were excluded from the study. Seventeen cases were thus identified. There were four deaths (mortality rate 23.5%). Follow up data were avail-
able on all the survivors, assessment methods used were: physical and neurological examination, X-ray film of skull, EEG, audiogram and psychometry (Stanford Binet test in children 2-4 yr, and Griffith scale in children greater than 2 yr). An abnormal child was defined as one with some neurological abnormality and or IQ less than 90.

For statistical calculations student ‘t’ test and normal difference method were used and a p value of <0·05 was considered significant.

Results

There were 14 female and three male infants. Thirteen were preterm (<36 wk) and the mean birth weight was 1975·4± 910·6 gm. The mean maternal age and parity were 25·5± 5·3 yr and 1·8± 1·7 respectively. Maternal and/or obstetric complications were present in 14 of the 17 cases; prolonged rupture of membranes (>24 h), chorioamnionitis and perinatal infection being the commonest conditions: Birth asphyxia (Apgar < 6 and (or) use of intermittent positive ventilation was present in 11 infants. Mean ages for diagnosis of meningitis and ventriculitis were 7·7± 5·2 and 4·5± 2·2 days respectively.

Table I gives the common clinical and laboratory features of the cases. Associated pneumonitis was present in four infants. Other features observed were: inappropriate ADH secretion 4, disseminated intravascular coagulation 3 and renal failure 3. Mean peripheral leukocyte count was 9·39± 9·4×10³/cm³ and band counts were elevated (>200/cm³) in 11.

Table II shows the CSF findings from lumbar and ventricular fluid. All blood, lumbar and ventricular fluid cultures were identical E. coli (11), group B streptococcus (3); citrobacter-enterobacter (2) and Pseudomonas pyocyneus (1).

Computed axial tomography, carried out between 1-3 days of diagnosis of ventriculitis was positive in 5 of the 9 infants, while brain scan showed evidence of ventriculitis in only 2 of the 7 cases.

Initial systemic antibiotic therapy (ST) used was a combination of ampicillin (400 mg/kg/day) and gentamycin (7·5 mg/kg/day). After the results of cultures were available drugs therapy was changed to : chloramphenicol (6) and carbenicillin (2). Six infants received antibiotics via Omaya reservoir and five had multiple intraventricular injection. Antibiotics used for intraventricular therapy (IVT) were gentamicin (7), cephaloridine (2) and carbenicillin (2).

The results of therapy and outcome are given in Tables III and IV. On follow up, at 18 months to 4½ yr, only five of the