NORMAL CEREBROSPINAL FLUID CELLULARITY IN CHILDHOOD PYOGENIC MENINGITIS

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SYNOPSIS

Three children with pyogenic meningitis with out significant pleocytosis in the cerebrospinal fluid are described. These cases emphasise the importance of culturing all CSF samples regardless of cellularity.

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INTRODUCTION

Cerebrospinal fluid (CSF) with an excess of polymorpho nuclear cells is the hallmark of acute bacterial meningitis(1). However cases of pyogenic meningitis in the absence of CSF pleocytosis have been reported in the literature (2,3,4). This is thought to reflect an early or developing pyogenic meningitis, particularly so when CSF glucose and protein are normal and gram stained smear is negative. We report 3 cases of children with acute pyogenic meningitis with normal CSF cellularity in the presence of low CSF glucose and positive smear or culture suggestive of acute bacterial infection.

REPORT OF CASES

Patient 1:

AS, a 1 year old female child was admitted with history of fever of 2 weeks duration and generalised tonic clonic fits which were brief but recurrent for 12 hours prior to admission. There was no history of prior antibiotic administration. Prior to the fever, she had been well with normal developmental milestones. The child, on admission, was febrile, unconscious with sluggish response to pain and decerebrate posture. Neck rigidity was present. The pupils were reactive, there was generalised spasticity, brisk reflexes and bilateral extensor plantar responses. Cardiovascular and respiratory systems were normal and abdominal examination revealed a palpable liver of 8cm. The heart rate was 102/mt and the blood pressure was 100/50 mmHg. Fundal examination revealed absence of papilledema. Preliminary investigations revealed the following: a haemoglobin of 8.6 g%, total white cell count 20,500/cumm with a differential count of neutrophils 70%, Lymphocytes 25%, Eosinophils 3% and monocytes 2%. The Blood urea was 1.2 mmol/L, Sodium 120 mmol/L, Calcium 2.00 mmol/L, Potassium 3.5 mmol/L. A chest X-ray revealed consolidation of the right upper lobe. The child was treated with intravenous mannitol infusion, Inj Phenytoin (10 mg/kg intravenous). A lumbar puncture was done after the infusion of mannitol and the CSF report was as follows: proteins 0.72 g/L, glucose 0.1 mmol/L, globulin in traces; the cell count was 3/cu mm, all lymphocytes. At this time, the blood sugar was 7.7 mmol/L. A gram stain of the CSF did not reveal any organisms. Latex agglutination was positive for H. Influenzae antiserum type B. CSF and blood cultures were positive for H. Influenzae. The liver function tests were normal; haemoglobin electrophoresis did not reveal abnormal haemoglobin bands and serum immunoglobulin assay revealed normal levels of Ig A, Ig M and Ig G. The child was started on Ampicillin (400mg/kg/day) and Chloramphenicol (100mg/kg/day) intravenously. However, the child did not improve; an Electroencephalogram done 48 hours after admission suggested bilateral cerebral damage. On the 3rd day after admission, the child died.

Patient 2:

A.H., a 11 month old boy was admitted with fever of 2 days duration and generalised tonic clonic fits 12 hours prior to admission. He had not received any drugs prior to admission. Prior to the illness, the child was reported to be well. On examination, the child was febrile. He was fully conscious and alert but inactive. The ears, throat and nose were normal. A systemic examination did not reveal any abnormalities. There was no neck rigidity, Kernig's sign was negative and the anterior fontanella was not full. Fundal examination revealed no papilledema. There were no neurological deficits. The haematological investigations revealed a haemoglobin of 11.3g% and total white cell count was 15600/cu mm with Neutrophils 41%, Lym-

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phocytes 57% and Eosinophils 2%. Serum electrolytes, blood urea, serum calcium were within normal limits the blood sugar was 5.9 mmol/L. A lumbar puncture was done and clear CSF was obtained, which revealed the following: protein 1.07 g/L, glucose 0.7 mmol/L, globulin positive, cell count - nil, gram stain - no organism seen. CSF culture and blood culture revealed H. Influenzae. CSF latex agglutination was positive for H. Influenzae antisera type B. Serum immunoglobulins showed Ig A, Ig M and Ig G within normal range and haemoglobulin electrophoresis did not reveal abnormal haemoglobulin bands. The child was started on Inj ampicillin (400mg/kg/day) and Chloramphenicol (100mg/kg/day) and Inj Phenytoin (10mg/kg) intravenously. He became afebrile on the 9th day and was discharged well on the 15th day.

Patient 3

S.M., a 2 year old female child was admitted with a history of low grade fever of 2 weeks duration and a hyperextended neck of 3 days duration. She was reported to be well prior to the onset of the fever. On examination, she was febrile, fully conscious and communicating well. She had neck retraction. The ears and the throat were normal. There were few anterior cervical lymph nodes bilaterally. The heart rate was 150/mt, the blood pressure was 100/60 mmHg, temperature, 38.2/degree/C. Cardiovascular and respiratory systems were normal. Abdominal examination showed a palpable liver of 3 cm and spleen of 3 cm. Neurologically, the cranial nerves, the pupils and the fundi were normal. There was no altered tone or reflexes. An X ray of the cervical spine did not reveal subluxation of joints or diminished jointspace. Haematological investigations revealed the following: haemoglobin 9.7%, total leucocyte count 14,600, with neutrophils 76% and Lymphocytes 24%. Blood urea, serum electrolytes and serum calcium were normal. The blood sugar was 5.4 mmol/L. A lumbar puncture revealed clear CSF which showed the following results: proteins 1.29 g/L, glucose 1 mmol/L, globulin positive; cell count 4/cumm with 75% lymphocytes and 25% polymorphs. A gram stained specimen revealed gram negative bacilli. However the CSF and blood culture reports were negative. Latex agglutination could not be done since the kits were not available. A serum immunoglobulin electrophoresis demonstrated Ig A, Ig G and Ig M within normal range and the haemoglobin electrophoresis did not show abnormal haemoglobin bands. The child was started on Inj Ampicillin (400mg/kg/day) and Inj. Chloramphenicol (100mg/kg/day); her neck stiffness was found to be improving on the 2nd day and she became afebrile on day seven. She was subsequently discharged on 13th day.

DISCUSSION

Bacterial meningitis in childhood still carries a high morbidity and mortality in developing countries. The outcome depends on the early diagnosis followed by appropriate antibiotics and measures to lower the cerebral edema. Once bacterial meningitis is suspected, a lumbar puncture is required. However, difficulties may be encountered in cases where CSF is normocellular but subsequently grows organisms on culture or, in cases where CSF is entirely normal but a repeat lumbar puncture subsequently confirms the diagnosis with the characteristic alteration in the proteins, glucose and cell count(5). Onorato et al(6) described 4 cases of pyogenic meningitis where the CSF initially appeared normal. Repeat lumbar puncture and CSF examination within 24 hours showed evidence of infection. It was initially believed that in bacteremic children, lumbar puncture itself may result in trauma to the meninges resulting in spread of infection to the CSF(7) but this postulation has not been verified in later studies(8). Petersdorf et al demonstrated that cisternal puncture in dogs with S. pneumoniae bacteremia does result in meningitis provided there are at least 10^3 organisms per milliliter of blood(9). It has been shown that most patients with pneumococcal bacteremia have less than 200 organisms per milliliter of blood(6). In the neonatal period, E. Coli septicaemia does produce bacteremia with greater than 10^3 organisms per milliliter in 30% of cases (10), and a similar situation possibly occurs in splenectomised patients with fulminant sepsis. In these two categories of patients, namely in neonates and in patients with absent spleen, trauma to the meninges as in a lumbar puncture may facilitate seeding of the CSF(6).

However, in the three cases described, the problem is one of hypo or acellular CSF in the presence of other parameters suggestive of infections. This phenomenon has been observed in patients with sickle cell disease who develop meningitis due to H. Influenzae or Strep. Pneumoniae perhaps due to defective inflammatory response(11). Our patients did not have sickle cell disease. The other possibilities for a decreased or absent inflammatory response could be extremes of age, early infections, fulminant infections, prior antibiotic therapy and immuno deficient states. Our first patient (A.S.) possibly had a fulminant infection. However, we find it difficult to correlate the absent CSF pleocytosis with meningeal infection in the other two cases in this series. The incidence of acellular meningitis is low; Hayward et al(12) observed normal CSF cell counts and proteins in 3 of 148 consecutive cases of meningitis. At Hospital Universiti Sains Malaysia, we have had 3 acellular CSF with meningitis in 127 cases of childhood pyogenic meningitis (2.36%) during the period 1984 - 1987. However, in our cases, CSF protein and glucose were suggestive of meningitis.

Additional diagnostic tests may be useful in the definitive diagnosis of meningitis. The importance of culture and gram staining cannot be overemphasised. Counter immunoelectrophoresis, Latex slide agglutination, elevated CSF biochemical parameters such as lactic acid(6) do play a role in early diagnosis of meningeal infections. In summary, acellular CSF does not exclude bacterial meningitis; culture of the specimen is extremely important and if clinical picture is strongly suggestive of meningitis despite a previously normal CSF, lumbar puncture should be repeated.

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