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Short report

Hydrocephalus and tuberculous meningitis in adults

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SUMMARY Hydrocephalus is well recognised as a complication of tuberculous meningitis in childhood. This complication may occur more frequently in the acute stage in adults than has been appreciated. Three cases are described to illustrate this observation. Early recognition and prompt treatment may improve mortality and morbidity at any age.

In tuberculous meningitis a survival rate of 80 to 90% is to be expected.[1] Distressing sequelae are common, however, and patients may survive with deficit such as mental retardation, epilepsy, hypothalamic disturbance, blindness and paraplegia.[2] These complications are more likely when hydrocephalus has been present. Our experience with tuberculous meningitis using computed tomographic scanning (CT) has suggested that hydrocephalus may be a more frequent feature of the acute stage in adults than has been appreciated previously. Five patients with tuberculous meningitis have been treated recently and four of these have had hydrocephalus. One of these patients presented very late in the course of her illness and died but three others responded to a policy of standard antituberculous therapy and active surgical management of the hydrocephalus. These three cases are presented to support our view that early treatment of hydrocephalus in tuberculous meningitis may improve the prognosis.

Case 1 After three weeks of increasing headache, nausea and vomiting an 18 year old man became confused and drowsy. On admission he was afebrile, responded to painful stimuli only, had neck stiffness, dilated unequal pupils responding sluggishly to light, with head and eyes deviated to the left and mild left hemiparesis.

The peripheral blood white cell count was $17{\cdot}3 \times 10^9$/l. The ESR was 13 mm/h and the serum sodium was 120 mmol/l. Lumbar puncture before admission had produced spinal fluid containing 250 white cells/mm^3, 90% lymphocytes, and a protein of 8·5 g/l with sugar of 2·8 mmol/l. No organisms were seen but *Myobacterium tuberculosis* was subsequently cultured. Chest x-ray was normal and a CT scan showed dilated lateral and third ventricles but a normal fourth ventricle.

Treatment was begun immediately with rifampicin, ethambutol, streptomycin, isoniazid, pyridoxine and dexamethasone in appropriate doses and fluid restriction was instituted for the hyponatraemia. It was felt that the parlous clinical state was in part related to the hydrocephalus and an external ventricular drain was inserted. Within two days there was a significant improvement in the general condition and mental state of the patient. After five days the ventricular drain was removed but the condition of the patient deteriorated and a repeat CT scan showed return of the hydrocephalus. A ventriculo-peritoneal shunt was inserted but there was little clinical improvement. A further scan showed the shunt to be blocked and following successful revision of the shunt the patient steadily improved. At review three months later the patient was asymptomatic and had no deficit although shortly afterwards he developed spinal arachnoiditis which has left him with a moderate paraparesis.

Case 2 Six months after an uncomplicated caesarian section a 36 year old woman developed headaches and right sided paraesthesiae, followed by lethargy, nausea and fever culminating in an acute confusional state. On admission two weeks after the onset she had pyrexia, confusion, neck stiffness, partial third and sixth nerve palsies, left hemiparesis and bilateral extensor plantar responses.

The ESR was 14 mm/h and the serum sodium was 120 mmol/l. Chest x-ray was normal. Lumbar puncture prior to her transfer produced spinal fluid at a pressure greater than 30 cm which contained

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258 white cells/mm³, 95% lymphocytes, a protein of 2·8 g/l and a sugar of 1·5 mmol/l. No organisms were seen or subsequently cultured. At the time of admission the CT scanner was undergoing servicing and hence a right carotid angiogram was performed to assess ventricular size and to explore the clinical possibility of intracranial abscess. Massive ventricular dilatation was demonstrated and a subsequent CT scan confirmed that all four ventricles were involved.

An external ventricular drain was inserted and later converted to a ventriculo-peritoneal shunt. Acid-fast bacilli were seen on examination of the ventricular fluid and *Myobacterium tuberculosis* was cultured. Treatment was begun with quadruple chemotherapy, dexamethasone and fluid restriction. The patient remained very ill during the first two weeks of her treatment but subsequently steadily improved mentally and physically. Her rehabilitation has been complicated by drug intolerance and an isolated epileptic fit but otherwise her recovery has been excellent.

Case 3 A 39 year old man presented with a ten day history of headaches and vomiting and then acute confusion. Examination revealed a drowsy, pyrexial man whose speech on rousing was a jargon dysphasia. There was no neck stiffness and neurological examination revealed only brisk reflexes.

Investigation showed hyponatraemia and a normal ESR. Both CT scan and the chest x-ray were normal. Lumbar puncture produced spinal fluid containing 60 white cells/mm³, 90% lymphocytes, protein 1·9 g/l and sugar 2·3 mmol/l. No organisms were detected. No specific treatment was given and ten days later the lumbar puncture was repeated. On this occasion acid-fast bacilli were seen on direct examination and *Mycobacterium tuberculosis* was cultured. Treatment with quadruple chemotherapy and steroids produced some improvement but ten days later the patient again became obtunded. A further CT scan showed considerable dilatation of the ventricular system. Insertion of an external ventricular drain was followed by rapid improvement but when this was removed one week later the patient again deteriorated. Repeat scanning showed re-expansion of the ventricular system and a ventriculo-atrial shunt was inserted. Steady improvement followed this procedure and although initial recovery was complicated by mild spastic paraparesis, assessment two years later shows no neurological disability.

Discussion

These patients have several features in common. All three were longstanding residents of Newcastle and had had no recognised exposure to tuberculosis. They all received BGG vaccination when younger, all had normal chest x-rays and normal sedimentation rate. The clinical history was short, mental impairment was present and hyponatraemia was a feature in each case, presumably related to inappropriate secretion of antidiuretic hormone. Each patient had been referred from a general ward and this group undoubtedly represent the more severe end of the spectrum of tuberculous meningitis.

Hydrocephalus was found in all three at an early stage of the illness. Initial improvement was certainly assisted by steroid treatment and resolution of hyponatraemia but it appears that ventricular drainage was directly related to this improvement, particularly in the first and third patients, and it is worth mentioning that in the second patient tubercle bacilli were found only in the ventricular fluid.

Hydrocephalus in tuberculous meningitis may be the result of several factors in combination or isolation. Blockage of cerebrospinal fluid egress and absorption by exudate, and impairment of absorption by high protein levels are of prime importance. It is recognised that the presence of hydrocephalus is frequently related to poor prognosis, particularly in children. Ventricular drainage is advocated where a child fails to improve or deteriorates despite the appropriate anti-tuberculous therapy.[3,4] In many cases where hydrocephalus has been shunted this has come late in the course of the illness where considerable neuronal damage may have already occurred. Our recent experience of tuberculous meningitis suggests that hydrocephalus may be a common complication in adults at presentation, that it should be sought actively and that if hydrocephalus is demonstrated early ventricular decompression should be combined with standard anti-tuberculous chemotherapy to attain the best therapeutic outcome. The risk of dissemination of the tubercle bacillus by the shunt has been discussed previously[5] but in the presence of adequate chemotherapy should not dissuade from intervention in the acute phase of the disease.

We would advocate that patients with tuberculous meningitis who are obtunded or have symptoms or deficit suggesting hydrocephalus should be transferred to a neurological unit where a CT scan or at least carotid angiography is available, and that if hydrocephalus is confirmed then ventricular drainage should form part of the immediate management.

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