Treatment of Parenchymatous Degeneration of the Brain by Ventriculo-Atrial Shunting of the Cerebrospinal Fluid

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DEMENTIA of the elderly has, until now, been considered a hopeless condition. The socio-economic factors of the institutional care of these patients in an increasingly elderly population make this a problem worthy of intensive study.

Recently, some cases of dementia with psychomotor retardation and ataxia associated with "normal cerebrospinal fluid pressure" and enlarged ventricular systems have been described in which ventriculo-atrial shunting of the cerebrospinal fluid has led to dramatic improvement in mental function. In these rare patients, there was no evidence of complicating intrinsic cerebral disease. The clinical picture of "symptomatic occult hydrocephalus with normal cerebrospinal fluid pressure" was attributed to the hydrocephalus.\(^1\)\(^2\) Patients with senile dementia or other degenerative brain disease often present a similar clinical picture and also have an enlarged ventricular system which is attributed to wasting of brain tissue, the so-called hydrocephalus ex-vacuo. We have employed ventriculo-atrial shunting in five patients with hydrocephalus ex-vacuo and parenchymatous degenerative disease of the brain in an attempt to alter the relentless progression of their disease.

To document the changes brought about by the operation, motion pictures, psychometric tests, and pneumoencephalograms were carried out before the ventriculo-atrial shunt and 8 weeks later. To make the postoperative assessment of mental function as objective as possible, the tests were conducted by psychologists not involved in the decision regarding the desirability of surgery in these patients. We are reporting the clinical histories and responses to ventriculo-atrial shunting in two of our patients, and summarizing the results in all five patients (Table 1).

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Case Histories

Case 1. A 73-year-old accountant had experienced 7 years of mental deterioration, slowness, incontinence, unsteady gait, and memory loss before admission to the hospital after a subarachnoid hemorrhage in January, 1966. A ventriculo-atrial shunt was carried out in March, 1966, which resulted in a remarkable restoration of mental and motor function and a return of continence.

First admission. The patient was first examined at the Cincinnati Veterans Administration Hospital in January, 1964. During the previous 5 years, slow progressive mental deterioration had been noted by his wife. Two months before admission, the patient had had an episode of confusion and lethargy. A subarachnoid hemorrhage was suspected but a lumbar puncture was not performed at another hospital. General examination was normal except for a blood pressure of 180/110. He was not oriented in time or place but could answer simple questions. He could not subtract 7 from 20 and could not recall an address after 3 minutes. The neurological examination was otherwise normal, except for a broad-based, slow, shuffling gait, and bilateral Babinski responses. A lumbar puncture showed an opening pressure of 120 mm of water and clear CSF. Bilateral common carotid angiograms were normal. In February, 1964, psychometric tests showed a halting circumstantial speech; he would start a sentence, stop in the middle, and then continue on an entirely different subject. He had difficulty in understanding what was required of him and tests had to be abandoned because he could not perform any given task. No assessment of mental function or I.Q. was possible. He was discharged in February, 1964.

Second admission. The patient was readmitted on January 28, 1966. His memory had deteriorated further, and he had frequent episodes of fecal and urinary incontinence.
TABLE 1
Summary of clinical features, pneumoencephalography, and results of ventriculo-atrial shunting of CSF in patients with parenchymatous degeneration of the brain

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age &amp; Sex</th>
<th>Clinical Diagnosis</th>
<th>Clinical Manifestations</th>
<th>Duration</th>
<th>Pneumoencephalography</th>
<th>Results of Operation</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>79 M</td>
<td>Alzheimer's Disease</td>
<td>Dementia, loss of memory, ataxia, incontinence</td>
<td>7 yrs</td>
<td>Dilatation of ventricles</td>
<td>No change</td>
<td>Marked improvement in mental function, gait, continence</td>
</tr>
<tr>
<td>2</td>
<td>54 M</td>
<td>Alzheimer's Disease Peripheral Neuropathy</td>
<td>Dementia, loss of memory, ataxia</td>
<td>7 yrs</td>
<td>Dilatation of ventricles, cortical atrophy</td>
<td>Slight reduction in ventricular size</td>
<td>Marked improvement in mental function and gait</td>
</tr>
<tr>
<td>3</td>
<td>56 M</td>
<td>Alzheimer's Disease</td>
<td>Dementia, mute, unable to swallow, pressure sores, incontinence, bedridden, contractures</td>
<td>8 yrs</td>
<td>Dilatation of ventricles, cortical atrophy</td>
<td>No change</td>
<td>Marked improvement in memory, return of limited vocabulary, eats unaided, sits in chair, healing of pressure sores</td>
</tr>
<tr>
<td>4</td>
<td>72 M</td>
<td>Creutzfeldt-Jakob Disease</td>
<td>Dementia, incontinence, few words left, bedridden, pressure sores, myoclonic jerks</td>
<td>8 mos</td>
<td>Dilatation of ventricles, cortical atrophy</td>
<td>Postmortem study; slight decrease in ventricular size</td>
<td>Improvement in swallowing, return of some sentences, disappearance of myoclonus</td>
</tr>
<tr>
<td>5</td>
<td>35 M</td>
<td>Huntington's Chorea</td>
<td>Dementia, severe chorea; institutionalized</td>
<td>6 yrs</td>
<td>Absence of head of caudate nucleus</td>
<td>No change</td>
<td>No change</td>
</tr>
</tbody>
</table>

* Autopsy findings: Carcinoma of lung, multiple pulmonary abscesses, Creutzfeldt-Jakob disease.

Eight days before admission, he had become listless and complained of headache, and his gait had become worse. When admitted, the blood pressure was 140/80 in the right arm. He did not know the date, season, or where he was. There was marked perseveration, apraxia, finger agnosia, right-left confusion, and he would frequently fall asleep. Motor power was good in the arms and legs, but the patient could not perform any purposeful movements. Deep tendon reflexes were normal and bilateral Babinski responses were present. A lumbar puncture on the day of admission showed xanthochromic fluid, opening pressure at 260 mm of water, 1,300 red blood cells, and no white blood cells per high-power field. Gait was tested 4 weeks after admission; at this time he could not walk or stand unsupported. A pneumoencephalogram showed symmetrical dilatation of ventricles (Figs. 1, 2). Psychometric tests on February 25, 1966, showed bizarre responses to questions and given tasks; again, no I.Q. estimate was obtainable.

Ventriculo-atrial shunt. On March 18, a ventriculo-atrial shunt with a medium pressure Spitz-Holter valve (opening pressure 30-40 mm CSF) was performed. Eight weeks after the shunt, the patient was able to walk unaided and had become continent. Psychometric testing on May 24, 1966, showed him cooperative and able to concentrate for long periods of time; the Wechsler I.Q. was 111. A repeat pneumoencephalogram showed no change in the ventricular system. He is now completely recovered.

The occurrence of a subarachnoid hemorrhage 5 years after the onset of symptoms may have contributed to the accelerated decline in mental function. There is, however, no doubt that the primary disorder was parenchymatous degeneration of the brain.

Case 2. A 54-year-old man had a 7-year history of loss of memory, ataxia, and difficulty in walking, and had had to use a cane for 1½ years. He was forced to retire from his job as manager of a gambling casino because of his difficulty with numbers.

First admission. The patient was first admitted to our hospital in November, 1964. The general examination was normal.