Ventriculo-venous Shunts for Infantile Hydrocephalus

A Review of Five Years' Experience with this Method*

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The multiplicity of operative procedures devised for the treatment of infantile hydrocephalus bears testimony to the difficulty of the problem and the ineffectiveness of measures for its control. After a generally unsatisfactory experience with several earlier methods, in 1959 we began a trial of ventriculo-venous shunting as described by Pudenz and Spitz and their collaborators. This communication describes our experience during a 5-year period ending in February, 1964 (Fig. 1). Fifty-two patients were treated surgically; follow up through December, 1964, is complete in 48 patients.

Clinical Methods

The necessity for a shunting procedure was determined by the history and other clinical evidence of hydrocephalus. Preoperative studies usually included ventriculography although this has generally been omitted in patients in whom the hydrocephalus developed in association with myelomeningocele. In most cases with ventriculography the thickness of the cerebral mantle was measured between the tip of the anterior horn and the inner table of the skull. The cerebrospinal fluid was analyzed in most patients. A Pudenz-Heyer valve has been utilized in all recent cases, for a total of 38; the Spitz-Holter valve was used in 10 earlier cases. The functional status of shunts lacking a flushing device has in some instances been determined by the method of Kagan et al. The operative procedures were performed by 11 different surgeons. Routine postoperative prophylactic antibiotics were not used.

Examination of Data

The etiologic factors responsible for the development of hydrocephalus are illustrated in Table 1. Hydrocephalus associated with myelomeningocele constitutes the largest group. In 14 of 21 such cases, myelomeningocele repair was done prior to the shunting procedure. The repair was usually performed because of leakage from the myelomeningocele. In 5 patients ventriculo-venous shunting was performed before repair of the myelomeningocele and in 2 patients with myelomeningocele only the shunting procedure was performed.

The duration of function of a shunt (Fig. 2) is given as the time from the initial procedure or from the last revision if revision has been performed. In our patients there has been no factor which has allowed an accurate prediction of the duration of function of a shunt.

There have been 120 operative procedures upon the 48 patients. This comprises the 48 initial shunting procedures, 45 revisions, and 11 related procedures such as the restoration of continuity of a separated shunting tube, evacuation of subdural fluid or repair of wound dehiscence. Sixteen shunting procedures of other types were performed as interval or terminal procedures on 6 children. Ninety-three procedures were in patients in whom the Pudenz-Heyer valves were used and 27 were in the Spitz-Holter group.

<table>
<thead>
<tr>
<th>Type</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicating hydrocephalus</td>
<td>18</td>
</tr>
<tr>
<td>Congenital</td>
<td></td>
</tr>
<tr>
<td>Post meningitis</td>
<td>3</td>
</tr>
<tr>
<td>Spina bifida</td>
<td>2</td>
</tr>
<tr>
<td>Non-communicating hydrocephalus</td>
<td>9</td>
</tr>
<tr>
<td>Aqueduct stenosis</td>
<td>5</td>
</tr>
<tr>
<td>Post meningitis</td>
<td>1</td>
</tr>
<tr>
<td>Dandy-Walker syndrome</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
<tr>
<td>Type not determined</td>
<td>21</td>
</tr>
<tr>
<td>(associated with myelomeningocele)</td>
<td></td>
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</tbody>
</table>

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Complications
Table 2 shows the 64 complications encountered in this series of 48 patients.

Obstruction of Shunt. Malfunction of the shunt by obstruction of various types was the most frequent complication. Revision of one or both ends of the shunt has been necessary in 19, or 40 per cent of our patients. Ten

Fig. 1. Chart showing atroventricular shunts done between 1959 and 1964.

Fig. 2. Chart showing the duration of function since the last operation in 35 survivors.