OBSERVATIONS ON VENTRICULAR AND LUMBAR SUBARACHNOID PERITONEAL SHUNTS IN HYDROCEPHALUS IN INFANTS*

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The treatment of progressive hydrocephalus has challenged for decades the ingenuity of general surgeons and, also, neurosurgeons since the infancy of our specialty.

Cushing's remarks in 1926 are to the point: "among the first of my patients—as will probably have been true of most young men entering this particular field—were infants with what is known as essential hydrocephalus, for which a greater number of treatments have as yet been advocated (I have been guilty of proposing one or two myself) than successes recorded—if indeed there are any clear-cut successes recorded."

We also plead guilty, not of excessive youth, but of early enthusiasm in approaching this problem and would like to present our trials and tribulations with this baffling condition. We hope that our successful cases will stimulate others to further interest and our failures offer data that will save others some of our headaches.

This presentation is primarily concerned with the ventricular and lumbar subarachnoid to peritoneal cavity shunts in infants having progressive hydrocephalus (Fig. 1).

We have done 10 ventricle to peritoneal cavity shunts in children and adults with obstructive ventricular lesions or tumors which did not respond to the Torkildsen procedure. Although the results were grati-

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Fig. 1. Peritoneal shunts used for primary operation (see text).
fying in some, the short followup does not justify any conclusions at this time.*

One might challenge our judgment in operating in some of the obviously hopeless cases, particularly those in which the hydrocephalus was associated with a meningomyelecele. In every instance, the parents were acquainted with the experimental nature of the operation and the unpredictability of results, and they either wanted the procedure done to keep their infant alive or to help develop it for others.

Drainage in some manner or another into the peritoneal cavity is an old story and has been reported by Ferguson (1898), Kausch (1905), Cushing (1908), Heile (1910), Hartwell (1910), and also by Davidoff in 1929, who added a thorough historical review of all treatments up to that time.

To the best of our knowledge, Cone of Montreal was the first to use plastic tubes (portex) for the shunt, and one of us (V. R.), who came as a resident from Dr. Cone’s service, started this work in our department in January, 1950.

Spitz and Koop, in 1952, presented their observations on 42 cases of hydrocephalus treated by lumbar-peritoneal shunt using a lucite peritoneal button and omentectomy, and reported 73 per cent survivals. They do not operate on infants with noncommunicating hydrocephalus and they have recently modified their technique to include teflon buttons. No data on their recent results are available in the literature as yet.

Data concerning our cases are presented in Tables 1 to 8 inclusive.

<table>
<thead>
<tr>
<th>Type of hydrocephalus*</th>
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<tbody>
<tr>
<td>Noncommunicating</td>
<td>10</td>
</tr>
<tr>
<td>Communicating</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
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* All determined by air injection.

DISCUSSION

Results of Operation and Complications. The infants tolerate the rapid drop in ventricular pressure well, probably because the fluid is reabsorbed through the peritoneal cavity. However, 1 death, from bilateral subdural hematoma, was probably caused by collapse of the brain with rupture of a subdural vein.

* The Torkildsen procedure can be combined with a lumbar subarachnoid to peritoneal cavity shunt to convert a noncommunicating hydrocephalus to a communicating one, and thus avoid placing a subcutaneous tube from ventricle to peritoneal cavity. However, this would require three separate craniospinal operations (skull trephine, suboccipital trephine and hemilaminectomy) as compared with one cranial operation (exploratory trephine) if the tube is inserted into the ventricle and then placed subcutaneously before insertion into the peritoneal cavity. The latter operation would be considerably less shocking to infants. The combined Torkildsen and lumbar procedure could be done as a two-stage operation in infants or for the relief of ventricular obstruction in certain cases of tumor in children and adults.