Technique for Transfontanelle Subdural Peritoneal Shunting in Subdural Fluid Collections of Infancy*

Technical Note

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The necessity for treatment of intracranial subdural hematomas in infants is universally accepted. There is still question, however, as to what constitutes ideal therapy in the individual case. The value of craniotomy with membrane removal was emphasized by Peet,9 elaborated upon by Ingraham and Heyl,6 and extensively evaluated by Ingraham and Matson.7 Good results have also been obtained in comparable cases treated simply with adequate internal subdural drainage and without the extensive surgery of membrane stripping.1,2,8,10,11

The purpose of this article is to illustrate a transfontanelle shunting technique in which burr holes are not necessary.

Surgical Technique

The routine of preoperative subdural aspirations emphasized by Ingraham and Matson was employed in the evaluation and stabilization of these infants.7 Reformation of fluid in spite of repeated aspirations constituted the indication for surgery.

Although blood transfusion was not given, all children were preoperatively prepared with a venous cut-down. They were then positioned semisupine with the trunk rotated 45° to the left, and the head another 45° to produce lateral cranial placement.

A small coronal incision was made at each lateral extremity of the anterior fontanelle and carried down to the dura (Fig. 1). A wide single incision was not used in order to avoid subgaleal fluid collection and possible interference with shunt drainage. Subsequent incisions were then made in the posterior midline scalp, behind the right ear, and over the right anterior thoracic abdominal area at the level of the umbilicus. The PE205 polyethylene tubing† was then brought down from each fontanelle incision to just above the level of the umbilicus and connected by blunt needle to a syringe of saline.

By means of a small dural incision in the most lateral aspect of the fontanelle, the catheters were then inserted forward 1½ cm. This permitted visualization of the outer and inner membranes as well as estimation of the relative volume of the subdural spaces. Escape of subdural fluid was never completely prevented. Water-tight closure of the dura was then made about each catheter, and a very tight holding suture was placed at the midline incision. Following this, the subdural space was gently filled with saline from below to maintain a head of pressure.

A peritoneal incision was then made at approximately the umbilical level (Fig. 1). A small incision just above this level aided in straightening kinked tubing. Once straightened, the tubing presented no difficulty and was inserted as far down as possible into the intraperitoneal cavity to compensate for future growth. It was considered imperative that the stay sutures be placed at the cranial end in order to maintain the tubes in the subdural space despite body growth. The opportunity for future operative lengthening of the tubing by means of Holter valve connectors‡ at the abdominal level without disturbing the fontanelle placement was thus insured.

The peritoneum was closed with continuous chromic catgut and the abdominal wall closed in anatomical layers. All other incisions were closed by single layered vertical mattress nylon sutures (Fig. 2).

Postoperatively, the children were maintained on intravenous fluids for 24 hours and then gradually returned to regular formula or diet. Sutures were left intact for 10 days.

† Intramedic Polyethylene Tubing, Clay-Adams, Inc., New York, N. Y.
‡ The Holter Co., Bridgeport, Pennsylvania.

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Results

Five successive cases of subdural fluid collection or hematoma were subjected to subdural peritoneal drainage. Four of these were done with the transfontanelle technique and followed for at least 1½ years (Table 1). A modified version with bilateral burr-hole placement was used in a fifth case because of fluid loculation. This latter child had sustained a severe head injury followed by periods of apnea and one episode of cardiac arrest.

Out of ten sides shunted, there were three initial failures. Bilateral failure occurred in Case 2, but the child responded to tube reinsertion. In Case 5, membrane stripping was eventually carried out on the right side, the left side having responded adequately to shunting.

On biparietal burr-hole exploration after extensive periods of time, Cases 1 and 2 demonstrated complete resolution of the hematoma membranes on both sides. Case 3 had complete resolution on one side but