Case Reports and Technical Note
Post-Traumatic Porencephaly in Infancy
A Report of Three Unusual Cases

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A good deal of confusion exists concerning the term porencephaly which was first used by Heschl in his report in 1859. Pseudoporencephaly and ventricular diverticula are but two of the expressions applied to variations in the appearance of these lesions. In an effort to avoid misunderstanding, Drew and Grant entitiled their report "Benign Cysts of the Brain." For the purpose of this discussion we have used the term as defined by LeCount and Semarak, "a defect communicating with the ventricles or separated from them by a thin layer of brain tissue and covered on the outside by arachnoid." The etiology of such cysts is diverse and may be broadly classified as developmental or acquired. In his excellent review of the literature, Naef has noted the changing views concerning the pathogenesis of this condition. Acquired porencephaly is due to destruction of cerebral tissue at any time and from various causes such as trauma, circulatory disturbances, or inflammatory or degenerative processes.

The importance of trauma at birth or in the neonatal period was emphasized by Jaffe in 1929. His case was that of a 20-year-old woman who had suffered severe trauma shortly after birth. Since that time few reports of porencephaly following trauma in infancy have appeared. In the series of Drew and Grant only 1 of the 30 cases fitted into this category, and in 2 other series the incidence was only 2 in 22 and 1 in 32. In the relatively short period of 6 months we have had the opportunity of seeing 3 unusual cases of porencephaly occurring in infancy. Each of these appears to be traumatic in origin, and these cases form the basis of this report.

**Case Reports**

**Case 1.** An 18-month-old white female was admitted to the District of Columbia Children's Hospital for repair of a leptomeningeal cyst. The child had been well until the age of 5 months when she was involved in an auto accident. In addition to a fractured femur, she had fractures of the left parietal and right frontal bones, the former depressed, the latter linear.

Twenty-four hours after the accident the depressed parietal fracture was elevated. In the postoperative period the child was irritable and ran a low grade temperature for several days. Lumbar puncture at this time disclosed bloody fluid. The child gradually improved and after 1 week the parietal skin stitches were removed. On the 10th hospital day a soft swelling was noted to the right of the anterior fontanelle. This was felt to be due to the frontal fracture. A pressure dressing was applied with an elastic bandage. Since the child was asymptomatic except for the swelling, she was discharged from the hospital. The mother was instructed in the rewrapping of the pressure dressing.

The child was next seen 1 month later. The swelling had diminished considerably in size. The mother was advised to continue the pressure dressing, but to return in 1 month if the swelling persisted. The child was not seen again for 11 months. When she returned the swelling had increased in size and a large irregular bony defect could be palpated in the area of the anterior fontanelle and to the right extending into the right frontal bone. The swelling measured 3×4 cm. It was soft and did not transilluminate. The child was admitted for excision and repair of what was felt to be a leptomeningeal cyst.

At the time of surgery a coronal incision was made. After the skin had been dissected from the lesion a fine needle was inserted and clear colorless fluid was obtained. The dome of the cyst was then opened and the cavity was seen to have a glistening white lining. Upon opening the ventral aspect of the cavity a large porencephalic cyst was encountered. One could look through the cyst into the foramen of Monro. Along the dorsal margins of the cyst the brain was adherent to the arachnoid and dura. The dural defect was closed with a fascial graft and the scar tissue was imbricated over the defect.

The patient made an uneventful postoperative recovery and was discharged from the hospital on the 8th postoperative day. She returned 11 weeks later; at this time a pneumocephalogram graphically demonstrated the lesion (Fig. 1).

Follow up through the next 8 months revealed progressive closure of the bony defect with the soft tissue being sunken and firm indicating that the seal was adequate. The patient was bright for her age and talked normally. The only neurological residual was a slight hyperreflexia on the left side.

**Comment.** This patient appears to have had a laceration of the right frontal cerebrum and its covering membranes at the time of the original injury. The recognition of the severity of the damage was somewhat obscured by the location

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of the lesion as well as by the presence of the depressed left parietal fracture and the fracture of the left femur. The presence of intracranial bleeding was established by the lumbar puncture; however, whether or not a localized hematoma existed is not known. Earlier closure of the dural defect probably would have resulted in a smaller cavity.

Similar cases have been presented and discussed under a variety of titles, including "Growing Skull Fractures of Childhood"12 and "Leptomeningeal Cysts . . . ."19,18

Case 2. An 11-day-old white female infant was transferred to District of Columbia Children's Hospital with a diagnosis of hydrocephalus and meningitis. The mother stated that her pregnancy had been unremarkable until 3 weeks prior to delivery when the membranes spontaneously ruptured. Since she was not under medical supervision, no antibiotic therapy was given during this interval. Delivery was uncomplicated.

The birth weight was 4 lb. 13 oz. The head circumference was 29.5 cm., the chest circumference was 29.0 cm. Physical examination shortly after birth was said to be normal. Because of the threat of infection, specimens of blood and urine and a pharyngeal smear were taken for culture and the infant was started on antibiotics. No growth was reported on any of the cultures after 3 days.

The child appeared to be progressing well and after 7 days the antibiotics were discontinued. Two days later the child began vomiting and the fontanelle was noted to be bulging. Cultures were again taken and antibiotics were resumed. Lumbar puncture was unsuccessful. At the time of transfer to the Children's Hospital, the head circumference had increased to 34.5 cm., an increase of 5 cm. in 11 days.

After admission to the Children's Hospital, several attempts were made to perform a lumbar puncture. When these attempts failed, ventricular puncture was performed. A pressure of 300 mm. of water was recorded and xanthochromic fluid was recovered. The protein was 236 mg./100 ml. and sugar was 32 mg./100 ml. No cells were present. Gram and acid fast stains of concentrated smears were negative as was an India ink preparation.

During the next 20 days of her hospitalization, 8 ventricular punctures were performed. Cultures and smears were made from these specimens and fluid was sent to other laboratories in the vicinity for culture. The protein content decreased to 55 mg./100 ml.; however, at no time did the sugar value rise above 32 mg./100 ml. Simultaneous blood sugar values were within normal limits.

Since the circumference of the head continued to increase in spite of removal of fluid, ventriculography was performed on the 30th day after admission (Fig. 2). A porencephalic cyst extended from each frontal horn. These defects seemed to originate at the site of the ventricular punctures.

In view of the progressive hydrocephalus, an operation establishing a ventriculo-atrial shunt was performed on the 27th day in the hospital. The shunt functioned well and the child was discharged on the 37th hospital day. She was followed for 10 weeks and appeared to be thriving. She died quite suddenly at home 3 months after discharge. No growth had been obtained on any cultures 2 months after plating. Autopsy was performed at another hospital but no changes other than hydrocephalus were noted on inspection of the brain. The cause of death was never definitely established.

Comment. This patient presented a difficult problem requiring frequent ventricular puncture. The issue of infection within the central nervous system led to delay in the management of the