Postmeningitic Subdural Effusions: The Syndrome and its Management

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Although subdural effusions have been recognized since 1950 as a complication of purulent meningitis in infants, the precise role of these fluid collections and associated membranes on the course and sequelae of the meningitis is not clear. Effusions have been implicated as a cause of seizures, persistent fever, focal neurological deficits, a poor or relapsing clinical course, and increased intracranial pressure. However, in as many as 50% of cases of meningitis without such manifestations, "routine" subdural taps may reveal fluid accumulations, and, conversely, effusions may be absent when clinically suspected.

There is a divergence of opinion as to the optimal management of postmeningitic effusions. Since many effusions following meningitis are encapsulated and resemble infantile subdural hematomas, techniques already in vogue for treating the latter have been applied to the former. Ingram and his associates have popularized the concept that craniotomy for stripping of subdural membranes is essential for achieving the best results. However, this notion has not gone unchallenged. Recently, some neurosurgeons, no longer convinced that removal of subdural membranes is necessary for successful treatment, have proposed various operations to shunt subdural fluid to other body cavities. Pediatricians, who have had the most experience in treating and following infants with meningitis and its complications, generally favor nonoperative management of subdural effusions and refer only recalcitrant cases for neurosurgical treatment.

This is a study of 30 selected cases of postmeningitic subdural effusions treated by repeated taps which were often followed by burr holes and craniotomy. Our analysis has failed to show a consistent causal relationship between the effusion and its mode of treatment and the clinical course and subsequent outcome. An appraisal of our results and those reported previously suggests that a more conservative approach to the treatment of postmeningitic subdural effusions can be justified.

Clinical Material

A review was made of the clinical records of 42 infants with postmeningitic subdural effusions cared for in the Riley Hospital for Children at the Indiana University Medical Center during the past decade. Twelve of these cases were excluded because of confusing factors such as trauma, failure to obtain fluid or positive bacterial diagnosis, severe hydrocephalus, and brain abscess.

Of the 30 representative patients selected for further review, 19 were male and 11 female. Their ages ranged from 1 to 32 months, all but one being under 18 months. The patients were admitted and initially managed on the pediatric service; however, all but three cases were subsequently evaluated or treated by the neurosurgical staff.

Hemophilus influenza type B was the etiologic organism in 19 cases, pneumococcus in four, and Neisseria meningococcus in two. In many instances the meningitis had been partially or inadequately treated with antibiotics prior to admission, and in five such patients no organism could be identified.

Inquiries and examinations were made to obtain follow-up data. The average follow-up for all patients was 26 months. Four patients followed for less than 6 months and one lost to follow-up were neurologically normal and progressing satisfactorily at the time of discharge.

Analysis of the Acute Syndrome

The stage of the illness during which the initial diagnostic subdural tap was done var-
ied considerably. Effusions were first discovered within a day to several weeks after the onset of meningitis, with about two-thirds being noted between the 3rd and 14th day of illness.

Indications for diagnostic subdural taps included a poor clinical course or persistent fever during medical treatment, suspected increased intracranial pressure, generalized or focal seizures, and focal neurological deficits. In some instances more than one indication was present, while in several the taps appeared to have been performed as routine procedures. However, there was no consistent clinical picture. For the most part, it was impossible to separate the toxic and inflammatory features of the meningitis and associated cerebral damage from any specific effects of the effusions or membranes. A number of infants who had tense fontanels, high fever, dehydration, and convulsions upon admission showed remarkable improvement after several days of medical therapy. Twenty-two infants in this series were already improving on antibiotic and supportive therapy when effusions were diagnosed.

Eight of the patients appeared to have been gravely ill when the first subdural tap was performed. With this group it seemed particularly appropriate to inquire into a possible cause and effect relationship between repeated subdural taps and clinical improvement. Rapid clinical improvement was noted in three severely ill infants who were tapped on the day of admission because of either a tense fontanel, seizures, or a hemiparesis. However, in the infant with the tense fontanel, a total of only 6 ml of fluid was removed by multiple taps during the first 6 days of hospitalization. In the infant with seizures, only 5 ml were obtained in the first 4 days. The improvement specifically attributable to removal of these small amounts of fluid is certainly questionable. The hemiparetic infant had bilateral taps upon admission because of the right side of the head transilluminated. An unrecorded amount of fluid was withdrawn from the right subdural space during the next 4 days with lessening of left-sided weakness. Decompression may have been helpful in this instance.

A fourth severely ill infant with a hemiparesis was not tapped until the third hospital day. Bilateral subdural punctures revealed only 8 ml of subdural fluid located ipsilateral to the hemiparesis; by this time the weakness had already begun to improve. Subdural taps were performed on two other sick infants 3 and 4 days after admission because of seizures. In the first infant, 36 ml were obtained over 7 days; in the second infant, 84 ml were collected over 11 days. In spite of the taps, seizures persisted in the first infant; he later manifested signs of severe brain damage. The second patient gradually improved after the subdural spaces were tapped dry.

A seventh case, seriously ill with H. influenza meningitis, had 3 ml of fluid removed from the right subdural space 1 day after admission. Three days later the taps were repeated, and only a few drops of blood could be obtained from each side. The infant made a good recovery, and antibiotics were discontinued on the 10th day. Two days later, because of an abnormal electroencephalogram, a unilateral effusion was discovered. There was subsequently a prolonged period of subdural taps and eventually a craniotomy. The eighth such case also had a smouldering course in association with H. influenza meningitis; 210 ml of subdural fluid were withdrawn over 12 days while the patient was receiving high doses of specific antibiotics, and he gradually improved during this period.

Analysis of Treatment and Results

Criteria. When seen in follow-up, patients were considered normal if they were without neurological deficit and had reached a level of development appropriate for their age. Patients were classified as mildly impaired if they had a slight residual hemiparesis, occasional seizures, or possible slowness of motor development. Those with major neurological deficits or obvious psychomotor retardation were considered severely impaired or defective. No deaths occurred in this series during the period of follow-up.

Summary of Treatments Used. The 30 cases reviewed have been divided into four treatment groups (Table 1). In 13 infants (Group 1) the effusions resolved with taps through the fontanel and no other procedures were done. Three patients (Group 2)