

# IS LUMBAR PUNCTURE JUSTIFIABLE IN THE FIRST FEBRILE SEIZURE ?

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## ABSTRACT

To ascertain whether LP was justifiable in cases of first simple febrile seizure, the records of 128 such patients were critically reviewed in this study.

It was evident that in 90% of those who received cerebrospinal fluid examination as a routine work up, lumbar puncture could have been avoided if the definition of simple febrile seizure was adhered to and the history and clinical findings were given due consideration.

## INTRODUCTION

Review of the pediatric literature reveals that the indications for lumbar puncture in a patient with febrile seizure is the subject of conflicting opinions.

While some authorities advocate CSF examination in all children with the first febrile convulsion and all children with a febrile seizure under two years of age,<sup>1</sup> others believe the need for lumbar puncture (LP) is determined by the circumstances and should be performed if, from the history and physical examination, one is not able to exclude the possibility of meningitis or encephalitis<sup>2</sup>.

Asnes et al, in a survey of 35 university pediatric departments, found that patient evaluation routinely included lumbar puncture<sup>3</sup>. In a nationwide survey of practicing pediatricians in the U. S. the same authors demonstrated wide variation in the approach to the diagnostic evaluation of children with their first febrile seizure, and only 41% of pediatricians performed LP as a routine procedure. The following study was undertaken to determine if there is a reasonable justification for routine lumbar puncture in the patient with a first febrile seizure.

## PATIENTS AND METHODS

From 1972 to 1976, the author conducted a retrospective study at West Virginia University Medical School to ascertain whether LP was justifiable in cases of first simple febrile seizure. Records of 128 cases of febrile convulsion at the pediatric department of the Charleston division of West Virginia University were

critically reviewed.

In this study, cases of febrile seizure were defined on the basis of the criteria suggested by Livingston, et al<sup>4,5</sup>. The patients were children between 6 months and 5 years old, who experienced a generalized seizure soon after an elevation of body temperature which did not last more than 5 minutes. They did not have signs of intracranial infection and their electroencephalograms were within normal limits two weeks after the febrile seizure. Accordingly, cases of epileptic seizure precipitated by fever were excluded.

The patients were divided into "tapped" and "untapped" groups. Tables I and II show the age, sex, number, and diagnosis at time of admittance and discharge in the two groups.

## RESULTS

In this retrospective study, special attention was paid to the patient's history, physical findings and laboratory data available at the time of admission. Based upon this information and the pediatrician's admitting diagnosis, it became evident that more than 70% of patients in the tapped group had clear clinical and/or paraclinical reasons for their fever and subsequent seizure, and 90% had no evidence to suggest the diagnosis of meningitis or encephalitis.

Less than 10% of the patients who received CSF examination were suspected of having meningitis, and this concern was worded in the admitting diagnosis as "rule out meningitis".

Among the tapped group, 5 patients had positive blood cultures. Three patients had *S. pneumoniae*

Table 1. Characteristics of patients with first febrile seizure: tapped group.

| Age (months)   |              | male                                     | female | Total        |
|--|--------------|--|--------|--------------|
| 6-36   |              | 32                                       | 12     | 44           |
| 36-48  |              | 7  | 5      | 12           |
| 48-60  |              | 2  | 2      | 4            |
|  |              |  |        | 60           |
| Admitting Diagnosis  | No. of cases | Discharge Diagnosis                      |        | No. of cases |
| Otitis Media   | 20           | Otitis Media                             |        | 22           |
| Pharyngotonsillitis  | 15           | Group A streptococcal                    |        |              |
|  |              | Pharyngitis                              |        | 10           |
|  |              | Herpangina                               |        | 2            |
|  |              | Pharyngitis of unidentified etiology     |        | 6            |
| Gastroenteritis  | 3            | Shigellosis                              |        | 1            |
|  |              | Gastroenteritis of unidentified etiology |        | 2            |
| Pneumonitis  | 6            | Pneumonitis                              |        | 7            |
| Febrile seizure of unidentified etiology including 5 cases of suspected meningitis | 16           | Roseola infantum                         |        | 3            |
|  |              | <i>H. influenzae</i> bacteremia          |        | 2            |
|  |              | <i>S. pneumoniae</i> bacteremia          |        | 3            |
|  |              | No cause found                           |        | 2            |

bacteremia and two had positive blood cultures for *H. influenzae*.

### DISCUSSION

The invasive procedure of lumbar puncture, at least on theoretical grounds, can predispose the child to bacterial meningitis. The remarkable similarity between the two groups of patients in regard to diagnosis is shown in tables I and II.

It is not disputed that CSF examination is the single most informative test for the diagnosis of meningitis, encephalitis and subarachnoid hemorrhage. If lumbar puncture were a safe, painless and innocuous procedure, there would be no cause for serious concern. But since complications such as osteomyelitis of the spine,<sup>4</sup> epidermoid tumor of the spinal cord,<sup>7</sup> flaccid paraplegia,<sup>8</sup> and cardiac arrest,<sup>9</sup> have all been encountered following spinal tap, careful consideration of its potential value and risks as a diagnostic tool is mandatory.

Petersdorf's investigation demonstrated that 81% of dogs with more than  $10^3$  bacteria in the bloodstream at the time of cisternal puncture, developed meningitis.<sup>10</sup> Similar observations have been made to some extent in humans. Fischer, et al<sup>11</sup> reported a patient who had *H. influenzae* sepsis at the time a lumbar puncture was performed. Autopsy revealed pus limited to the area of the spinal cord near the site of the initial lumbar puncture. In Rapkin's report,<sup>12</sup> all of the patients whose

second LP was diagnostic of meningitis had sepsis at the time of the first lumbar puncture.

To make matters more complicated, it should be known that performing lumbar puncture in proven cases of meningitis may have catastrophic consequences. Heldrich, et al<sup>13</sup> recently reported the fatal outcome of two infants with bacterial meningitis shortly following diagnostic LP. Each child progressed rapidly from stupor to coma with fixed, dilated pupils within four hours of admission and lumbar puncture. Autopsy showed cerebellar herniation in one infant and temporal lobe herniation in the other.

Five patients of the tapped group in this series had sepsis or bacteremia at the time of LP and accordingly were at risk of developing meningitis. 44 patients in the tapped group (73%) had clear-cut clinical signs to diagnose their problem at the time of lumbar puncture. These consisted of a bulging erythematous tympanic membrane, hyperemic pharynx and/or tonsils, some with exudate, tender cervical lymph nodes, and pathologic breath sounds accompanied by radiological evidence of pneumonic infiltration of the lungs. While there is no doubt that properly performed LP is a "must" when intracranial infection is suspected, it is clear that the majority of tapped patients in this report had no evidence of intracranial infection and should not have been submitted to lumbar puncture.

If it were not for routine lumbar puncture in a patient with simple febrile seizure, the agony of pain, fear of complications and unnecessary expense could be eli-

Table II. Characteristics of patients with febrile seizure: untapped group.

| Age (month)                      |              | male                                  | female | total        |
|----------------------------------|--------------|---------------------------------------|--------|--------------|
| 6-3                              |              | 28                                    | 12     | 40           |
| 36-48                            |              | 13                                    | 5      | 18           |
| 48-60                            |              | 6                                     | 4      | 10           |
|                                  |              |                                       |        | 68           |
| Admitting Dx.                    | No. of cases | Discharge Dx.                         |        | No. of cases |
| Otitis media                     | 15           | Otitis media                          |        | 20           |
| Pharyngotonsillitis              | 18           | Group A streptococcal pharyngitis     |        | 8            |
|                                  |              | Herpangina                            |        | 4            |
|                                  |              | Pharyngitis of unknown Cause          |        | 6            |
|                                  |              |                                       |        | 13           |
| Pneumonitis                      | 10           | Pneumonitis                           |        | 2            |
| Gastroenteritis                  | 5            | Gastroenteritis due to <i>E. coli</i> |        | 1            |
|                                  |              | Shigella                              |        | 2            |
|                                  |              | Unidentified                          |        | 3            |
| Febrile seizure of unknown cause | 20           | <i>S. pneumoniae</i> bacteremia       |        | 6            |
|                                  |              | Roseola infantum                      |        | 3            |

minated in 90% of these patients. One may argue that complications of lumbar puncture are rare, but the rarity of a condition is little consolation to those who suffer from it. In view of the similarity of presenting symptoms and diagnosis, mainly febrile seizure, among the tapped and untapped groups, it becomes clear that a pediatrician's bias toward routine lumbar puncture in a case of first simple febrile seizure was the main factor in subjecting these children to this procedure. The practice of medicine is an art and should be individual to each patient, and all technical procedures should be tailored to the specific needs of the particular patient.

This review showed that little can be gained by indiscriminate lumbar puncture in a patient upon his first febrile seizure.

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### Editorial Comment

This paper is an *interesting look* at the subject of febrile seizures in children. However, according to our views, lumbar puncture should be performed whenever the diagnosis of meningitis is known or suspected. Meningitis is a very dangerous and life threatening condition and early diagnosis can play a very important role.

Undoubtedly, the best and easiest way to identify the presence or status of infection of the CNS is lumbar puncture, and no other procedure can replace it. Therefore, we can not ignore this very valuable procedure if meningitis is to be identified as early as possible.

It is quite clear that the result of most lumbar punctures is normal. For example, of 709 children who underwent lumbar puncture because of suspected meningitis in 1970 at Down State Medical Center in Brooklyn, NY, only 16% were found to have an abnormal CSF. In this study, only 2% of children who underwent lumbar puncture because of seizures had meningitis.<sup>1</sup>

A similar survey of lumbar punctures performed in the walk-in clinic at Boston City Hospital revealed that one in ten procedures served to identify meningitis (bacterial or aseptic).<sup>2</sup>

*We believe that caution must be used in managing the child with fever who has had a seizure. Unless the physician is confident that the child is alert and well and has no suggesting signs of meningitis, lumbar puncture should be considered.*

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