International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Role of Lumbar Puncture in First Episode of Seizures with a Febrile Illness in Children Aged 6 - 18 Months

Vinod Muniyappa[1], Chaitra Shrinidhi[2], A C Ramesh[3]

Assistant Professor, Department of Pediatrics, BGS Global Institute of Medical Sciences, Bangalore, India (Corresponding Author)

Assistant Professor, Department of Pediatrics, BGS Global Institute of Medical Sciences, Bangalore, India

[3]Professor and Head of Department, Department of Pediatrics, BGS Global Institute of Medical Sciences, Bangalore, India

Abstract: ***Background: Fever with seizures in children may be due to simple febrile seizure, complex febrile seizures or secondary to a neuroinfection. The likelihood of acute bacterial meningitis (ABM) in febrile children with seizures ranges from 0.6% to 6.7%. Objectives: To identify the group of 6-18 month old children with the first episode of fever with seizure who would benefit from cerebrospinal fluid (CSF) examination. Method: The study group comprised 6-18 month old children, admitted with a febrile illness and first episode of convulsion with the admission occurring within 24 hours of the convulsion. Children with previously documented intracranial infection or neurological abnormality were excluded. Results: Of the 29 children included in study, 4 (13.8%) were diagnosed as having ABM. In the 6-12 month age group, 3(25%) children had ABM compared to one(6 %) in the 12-18 month age group. In the 6-12 month age group 2 of the 3 children with ABM had no meningeal signs and 1 had meningeal signs. In the 12-18 month age group the child with ABM had meningeal signs. Signs of meningeal irritation had high specificity in diagnosing ABM. Conclusions: Lumbar puncture (LP) and CSF examination are important in ruling out ABM, when a child of age 6-18 months presents with first seizure associated with a febrile illness, particularly so in children aged 6-12 months. Whenever meningeal signs occur in such children, there is a significant chance of ABM.***

Keywords: Lumbar puncture; febrile seizures; cerebrospinal fluid; acute bacterial meningitis.

1. Introduction

A seizure is a transient occurrence of signs and or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. Up to 10% of children present to the emergency department with seizures. Fever with seizures is the most common type of seizures occurring in children.[1,2] Fever with seizures may be due to simple febrile seizure, complex febrile seizure or secondary to some serious underlying etiology like neuroinfection. Febrile seizures (FS) is the commonest form of fever with seizures in young children; by age 5 years, 2-5% of children experience one or more FS.[2-4]

The likelihood of acute bacterial meningitis (ABM) in febrile children with seizures ranges from 0.6% to 6.7%[1]. Early diagnosis and prompt treatment of ABM are essential to minimise severe long term sequelae.[5] Cerebrospinal fluid (CSF) examination helps in this objective.

In 1996, the American Academy of Pediatrics (AAP) consensus statement recommended CSF analysis strongly for infants 6 to 12 months of age with a first simple febrile seizure and to be considered for children 12 to 18 months of age with a first simple febrile seizure.[6]

In 2011, Guidelines for the Neuro-diagnostic Evaluation of the Child with a Simple Febrile Seizure concluded that meningitis should be considered in the differential diagnosis for any febrile child, and lumbar puncture (LP) should be performed if there are clinical signs or symptoms of concern and it is an option in: (i) an infant of 6 to 12 months who are deficient or unknown status of Hib or *Streptococcus pneumoniae* immunizations and (ii) children who are pre-treated with antibiotics. However, in a few countries, the use of pneumococcal vaccines is not yet extensive.[5]

Therefore, in such conditions, these guidelines probably require some modification. In the above context, we conducted the current study to determine the relevance of routine LP, in our setup, in 6 to 18 month old children having first episode of fever with seizures.

2. Objectives

To identify the group of 6-18 month old children with the first episode of fever with seizure who would benefit from CSF examination

3. Method

Type of study: Prospective hospital based time bound study.

Inclusion Criteria:

- First episode of convulsion
- Associated febrile illness, and
- Admitted within 24 hours of the convulsion

Exclusion Criteria:

- Previously documented intracranial infections in current episode.
- Cases for which LP was already done outside for the current episode.
- Prior neurological abnormality.

- Any contraindication for LP

We designed a prospective hospital based time bound study. Data were collected over one year. The study population consisted of 29 children aged 6-18 months admitted to the pediatric ward with a history of first episode of seizure with associated febrile illness who satisfied the inclusion criteria.

Cases were studied with reference to clinical history and physical findings. Respiratory rate, heart rate, axillary temperature, weight, height, head circumference and weight for height were measured on admission. A detailed neurological examination was done. LP was done and CSF was sent for cell count, differential count, sugar, protein, Gram's stain, Ziehl Neelsen stain and culture.

ABM was diagnosed if child had a combination of all three of the following: CSF cells >5/mm^3, protein more than 100mg/dl and Sugar <40 mg/dl or <50% serum glucose.[8] Growth of bacteria in the CSF and/or positive Gram's stain was considered as culture proven ABM. Informed consent was taken from the parents or the guardians before enrolment into the study.

Statistical analysis: This was done using SPSS 17 software. Statistical methods used were percentages, means and tests of significance like Fisher's exact test, Chi square test and Student t-test.

4. Results

Total number of children who fulfilled inclusion criteria in our study was 29. In our study, we noted that there were 12 (41.4%) children in the 6-12 month age group. In the 12-18 month age group there were 17 (58.6%) children. Mean age of presentation was 11.3 ± 3.53 months. Out of the 29 children enrolled in our study, 19 (65.5%) were male and 10 (34.5%) were female (M: F = 1.9:1). In 6-12 months age group, 3 (25%) had ABM as compared to 1 (6%) in 12-18 months age group. This is shown in Figure 1.

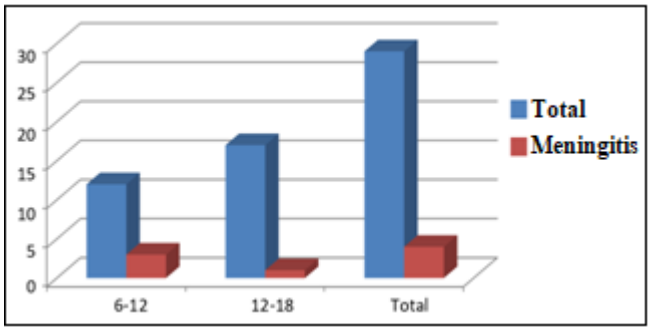

Figure 1: Distribution of acute bacterial meningitis in different age groups

Among the study group, we noticed that fever and convulsion was the presenting complaint in all 29 (100%) cases followed by associated symptoms cold in 12 (41.4%) cases, vomiting in 3 (10.3%) cases and loss of consciousness in 1 (3.4%) case. Among the study group, cause of fever was upper respiratory tract infection in 12 (41.38%) cases, ADD in 6 (20.68%) cases, ABM in 4 (13.8%) cases; urinary tract infection in 2 (6.9%) case and cause of fever was unknown in 5 (17.24%) cases. Meningeal signs were found to be significantly associated with ABM with a specificity of 100%. This is shown in Table 1.

Table 1: Association of meningeal signs with acute bacterial meningitis

Meningeal signs	Meningitis	No meningitis	p-value
Present	02	0	<0.005
Absent	02	25	
Total	04	25	

Sensitivity=50%, specificity=100%, positive predictive value=100%, negative predictive value=50%,

In the 6-12 month age group, 2 (18.2%) children had ABM without meningeal signs while in the 12-18 month age group all children with ABM had meningeal signs. This is shown in Table 2.

Table 2: Acute bacterial meningitis without meningeal signs in different age groups

Age in months	Meningeal signs	
	Positive	Negative
6-12	1	2
12-18	1	0
Total	2	2

p = 0.5

5. Discussion

In our study, out of the 29 cases of fever with first episode of seizure, 19 (65.5%) were male and 10 (34.5%) were females. M: F ratio was 1.9:1. Such observation of male preponderance was similar to other studies.[9-12.] ABM should not be missed in any child with fever and seizures. Among the 29 cases presenting in the emergency room with apparent febrile seizures 4 children (almost 1 in 7) had ABM. Two cases had culture positive ABM while 4 cases had ABM based on CSF cytological and biochemical criteria.[8] In another study done in Kathmandu, 10.9% of patients with apparent first FS had ABM. Other studies on ABM in apparent FS have found the incidence of ABM to vary from 2-7%.[13-15] Among the 29 children with apparent febrile seizures, 4 had meningitis. Infants aged 6-12 months had higher risk of meningitis compared to children aged 12-18 months. Other studies also had similar results.[1,2] Meningeal signs were found to be significantly associated with meningitis.

Our study suggested that in children aged 6-12 months there is a possibility of having meningitis without signs of meningeal irritation compared to the children aged 12-18 months but the difference was not statistically significant. This is comparable to other studies[1,2].

None of our study subjects were immunised against *S. pneumoniae;* this is a common situation in countries where pneumococcal immunization is not in the national immunization schedule. Therefore the Guidelines for the Neurodiagnostic Evaluation of a Child with Febrile Seizure of 2011 are likely to be less relevant for our situation.

Our study has the following limitations: It was a time bound study and the sample size was small

6. Conclusions

- LP and CSF examination is important in ruling out ABM, when a child of age 6-18 months presents with first seizure associated with a febrile illness; particularly in children aged 6-12 months.
- Whenever meningeal signs occur in children with first episode of seizure with febrile illness, there is a significant possibility of ABM.

References

[1] Joshi BR, Rayamajhi A, Mahaseth C. Children with first episode of fever with seizure: is lumbar puncture necessary? *Journal of the Nepal Medical Association* 2008; **47**: 109-12.
[2] American Academy of Pediatrics-Subcommittee on Neurodiagnostic evaluation of the child with a simple febrile seizure. *Pediatrics* 2011; **127**: 389-94.
[3] Batra P, Gupta S, Gomber S, Saha A. Predictors of meningitis in children presenting with first febrile seizures. Pediatr Neurol 2011; 44: 35-39.
[4] Owusu-Ofori A, Agbenyega T, Ansong D, Scheld WM. Routine lumbar puncture in children with febrile seizures in Ghana: should it continue? Int J Infect Dis 2004; 8: 353-361.
[5] Chinchankar N, Mane M, Bhave S, et al. Diagnosis and outcome of acute bacterial meningitis in early childhood. Indian Pediatr 2002; 39: 914-921.
[6] Kimia AA, Capraro AJ, Hummel D, Johnston P, Harper MB. Utility of lumbar puncture for first simple febrile seizure among children 6 to 18 months of age. Pediatrics 2009; 123: 6-12.
[7] Suresh K, Saxena D. Trends and determinants of immunisation coverage in India. J Indian Med Assoc 2000; 98: 10-14.
[8] Saleh F. Al-Ajlouni, Imad H. Kodah. Neurosciences 2000; 5: 151-215.
[9] Ganesh R, Janakiraman L. Serum zinc levels in children with simple febrile seizure. Clin Pediatr. 2008; 47: 164-166.
[10] Ehsanipour F, Talebi-Taher M, Harandi N, Kani k. Serum zinc level in children with febrile convulsion and its comparison with that of control group. Iranian J Pediatr. 2009; 199: 65-68.
[11] Mahyar A, Pahlavan AA, Nejad AV. Serum zinc level in children with febrile seizure. Acta Medica Iranica 2008; 46: 477-480.
[12] Nelson KB, Ellenberg JH. Prognosis in children with febrile seizures. Pediatrics. 1978 May;61(5): 720-727.Al-Ajlouni SF, Kodah IH. Febrile convulsions in children. *Neurosciences*2000; **5**(3): 151-5.
[13] Jaffe M, Bar-Joseph G, Tirosh E. Fever and convulsions - indications for laboratory investigations. Paediatrics 1981;67: 729-731.
[14] Abuekteish F, Daoud AS, al-sheyyab M, Nou'man M. Demographic characteristics and risk factors of first febrile seizures: a Jordanian experience. Trop Doct 2000 Jan;30: 25-27.
[15] Teach SJ, Geil PA. Incidence of bacteremia, urinary tract infections, and unsuspected bacterial meningitis in children with febrile seizures. Pediatr Emerg Care 1999 Feb;15: 9-12.

Author Profile

Dr Vinod Muniyappa received his Masters degree from Karnataka Institute of Medical Sciences, Hubli in 2014, one year worked in Narayana Hrudayalaya, Mysore and began working at BGSGIMS Medical college since 2015. He is Department Academic Registrar working under the able guidance of her HOD and continues to be a part of all department related educational activities.

Dr Chaitra Shrinidhi, Assistant Professor in the Department of Pediatrics at BGSGIMS Medical college is a constant support and ensures that research related activities are always on the go in the department.

Dr A C Ramesh, Professor and Head of the Department of Pediatrics at BGSGIMS Medical College. He has been an instrumental person in promoting research and guiding staff and students for publications.