Prevalence of meningitis in the first episode of febrile seizure in children aged between sixto 18 months- Chirag Saluja, Safdarjung Hospital, India

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Abstract

Background: Febrile seizures (FS) are the most common type of childhood seizures, affecting 2–5% of children older than 1 month and most commonly from 6 months–5 years old. It is a major cause of paediatric admissions worldwide. In India, AAP 2010 guidelines are followed for performing Lumbar Puncture (LP) in first episode of febrile seizure despite India having wide difference in the epidemiology of meningitis and immunisation coverage as compared to USA. This study has been done to find out whether AAP guidelines are applicable in India also or there is a need for our own guidelines. Although FS induce by age related hyper-excitability of the brain to fever, determining the cause of the fever is critical in the evaluation of these children. The relationship between seizure and bacterial meningitis has been identified well in previous studies. Seizures may be the sole presentation of bacterial meningitis in febrile infants. Seizures are the first manifestation of meningitis in 16.7% of children and in one-third of these patients, whereas meningeal signs and symptoms may not be evident. Therefore, it is mandatory to exclude underlying meningitis in children presenting with fever and seizure prior to making the diagnosis of FS. The initial concern in these children is always to make a proper decision regarding to do an LP to exclude meningitis. Awareness of the prevalence of meningitis and its related factors in children presenting with FS to help physicians to make proper decisions in these situations is necessary. There are several clinical studies worldwide reporting the prevalence of meningitis among children with FS. Some of these studies suggest that in the absence of typical meningeal signs, then an LP should be considered in children with complex seizures, prior antibiotic therapy, age less than 12 months, or incomplete vaccination history.The present study determines the prevalence of meningitis and its associated risk factors in children with FS.

Aims & objectives: Primary Objective-To find out the prevalence of meningitis in first episode of febrile seizure in children aged 6 to 18 months. Secondary Objective-To find out predictors of meningitis in in children with first episode of febrile seizure.

Materials & Methods: A cross-sectional study over a period of 18 months was carried out in paediatric wards of Safdarjung Hospital. LP was performed and results analysed for meningitis as per guidelines. Exclusion criteria included history of previous non-febrile seizures or a previously diagnosed underlying illness associated with seizures, an immune compromised state, or the presence of a ventriculoperitoneal shunt or known trauma. The data collected were age, gender, type of seizure, history of previous FS, signs of meningeal irritation (neck stiffness, Kernig's or Brudzinski's Sign(s)), impaired consciousness lasting longer than one hour after seizure, pretreatment with antibiotics (from any rout for days before occurring seizure), and results of LP, cerebrospinal fluid (CSF) culture, and blood culture. CSF pleocytosis was defined as a white blood cell (WBC) count of 6μL or more in the CSF. The WBC count for traumatized LP was determined by using the following corrections: corrected CSF WBC count= (CSF WBC count – [CSF red blood cell count/500]). Bacterial

meningitis (BM) was defined as growth of a pathogen from CSF culture or CSF pleocytosis with growth of a pathogen from the blood culture. CSF pleocytosis with mononuclear cell dominancy and no growth of a pathogen from CSF or blood culture was considered as aseptic meningitis if the patient was not pretreated with antibiotics during the previous week. In cases with CSF pleocytosis and history of pretreatment with antibiotics if a diagnosis of BM was given on the side of caution and the patient was treated as having BM, we identified her or him as a case of BM.

Results: 200 cases were analysed. The prevalence of meningitis in children aged 6 to 18 months presenting with first episode of Febrile Seizure was 16%.Bacterial Meningitis was seen in 3%.The independent predictors of meningitis were high TLC(>16500/mm^3),positive CRP and prematurity. High grade fever (>102˚F), high seizure duration (>12 minutes), low MCV (<75fl), malnutrition (lesser weight for age) and longer post ictal state duration(>14 minutes) were seen as predictors of meningitis but after logistic regression they were not found to be independent predictors. Streptococcus pneumoniae was the most common organism isolated in the blood (42.8%) as well as the CSF (50%) of the cases taken. Most common type of cell seen was monocytes which were alone seen in 56.2% of the meningitis cases.

Conclusion: India needs its own guidelines for performing LP in cases of first episode of FS. Meningitis can be predicted in those with high TLC (16500/mm^3), CRP positive and who are prematurely born.

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References

1. Kwang SK. Bacterial meningitis beyond the neonatal period. In: Cherry JD, Harrison GJ, Kaplan Sh L, Steinbach WJ, Hotez PJ, editors. Feigin and Cherry's textbook of pediatric infectious diseases. Philadelphia: Elsevier, Saunders; 2014. pp. 425–472.
2. Joshi Bataloo R, Rayamaihi A, Mahaseth C. Children with first episode of fever with seizure: is lumbar puncture necessary? JNMA J Nepal Med Assoc. 2008;47(171):109–112.
3. Kimia A, Ben-Joseph EP, Rudleo T, et al. Yield of lumbar puncture among children who present with their first complex febrile seizure. Pediatrics. 2010;126:62–69.
4. Hom J, Medwid K. The low rate of bacterial meningitis in children, ages 6 to 18 months, with simple febrile seizures. AcadEmerg Med. 2011;18(11):1114–1120.
5. Al-Eissa YA. Lumbar puncture in the clinical evaluation of children with seizures associated with fever. PediatrEmerg Care. 1995;11(6):347–350.
6. Fetveit A. Assessment of febrile seizures in children. Eur J Pediatr. 1998;167(1):17–27.
7. Subcommittee on Febrile Seizures. Febrile seizures: Guidelines for the neurodiagnostic evaluation of the child with a simple febrile seizure. Pediatrics. 2011;127(2):389–394.
8. Rosman NP. Evaluation of the child who convulses with fever. Pediatr Drugs. 2003;5(7):457–461.
9. Laditan AA. Analysis of the results of routine lumbar puncture after a first febrile convulsion in Hofuf, Al-Hassa, Saudi Arabia. East Afr Med J. 1995;72:376.
10. Dubos F, De la Rocque F, Levy C et al. Sensitivity of the bacterial meningitis score in 889 children with bacterial meningitis. J Pediatr. 2008;152:378–382.

11. Nigrovic LE, Kuppermann N, Macias CG, et al. Clinical prediction rule for identifying children with cerebrospinal fluid pleocytosis at very low risk of bacterial meningitis. JAMA. 2007; 297(1):52–60.
12. Najaf-Zadeh A, Dubos F, Hue V, et al. Risk of bacterial meningitis in young children with a first seizure in the context of fever: a systematic review and meta- analysis. PLoS One. 2013;8(1) e55270. Doi: 10. 1371/journal. pone.0055270.
13. Ghotbi F, Shiva F. An assessment of the necessity of lumbar puncture in children with seizure and fever. J Pak Med Assoc. 2009;59(5):292–295.
14. Owusu-Ofori A, Agbenyega T, Ansong D, et al. Routine lumbar puncture in children with febrile seizures in Ghana: should it continue? International Journal of Infectious Diseases. 2004;8:353–361.
15. 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(1):6–12.
16. Shaked O, Pena BM, Linares MY, Baker RL. Simple febrile seizures: are the AAP guidelines regarding lumbar puncture being followed? Pediatr Emerg Care. 2009;25(1):8–11.
17. Casasoprana A, Hachon Le Camus C, Claudet l, et al. Value of lumbar puncture after a first febrile seizure in children aged less than 18 months. A retrospective study of 157 cases. Arch Pediatr. 2013 Pil: S0929-693X (13)00238-8.
18. Ehsanipour F, Khodapanahandeh F, Aslani Z. The prevalence of meningitis in children with febrile seizure hospitalized at Hazrat Rasoul hospital (1997-2002) Journal of Iran University of Medical Sciences. 2004;44:907–912.
19. Tinsa F, EL GhrbiA, NcibiN , et al. Role of lumbar puncture for febrile seizure among infants under one year old. Tunis Med. 2010;88(3):178–183.
20. Carrol W, Brookfield D. Lumbar puncture following febrile convulsion. Arch Dis Child. 2002;87:238–240.
21. Rossi LN, Brunelli G, Duzioni N, et al. Lumbar puncture and febrile convulsion. Helv Pediatr Acta. 1986;41(1-2):19–24.
22. Mikati M A. Febrile seizures. In: Behrman RF, Kliegman RM, Jenson HB, editors. Nelson Textbook of Pediatrics. 19th ed. Philadelphia: Saunders; 2011. pp. 2017–19.
23. American Academy of Pediatrics. Provisional Committee on quality improvement, Subcommittee on Febrile Seizures. Practice parameter: the neurodiagnostic evaluation of the child with a first simple febrile seizure. Pediatrics. 1997:769–772.
24. Seltz LB, Cohen E, Weinstein M. Risk of bacterial or herpes simplex virus meningitis/encephalitis in children with complex febrile seizures. Pediatr Emerg Care. 2009; 25(8):494–497.