

Fever provoked seizures in young infants aged 1 to 6 months; an undescribed entity.

Dr Aajaz Ahmad Mir

Abstract:

Introduction: Seizures are the most common neurological emergency in infants. They need immediate management to prevent morbidity & mortality. Febrile seizures, defined as fever provoked seizures in children 6 months to 5 years of age, are most common type of seizures in children. We described fever provoked seizures in young infants aged 1 to 6 months.

Method: Study was conducted as a prospective observational study of 109 young infants, aged 1 to 6 months with seizures, over 2 years period from 2016 to 2018 in a tertiary care children hospital in Kashmir to find the aetiology of seizures.

Results: We found fever provoked seizures as the second most cause of seizure in this age group, 17 cases. Other causes included Cerebral palsy 6, Circulatory shock 9, Hypoglycaemia 5, Meningitis 5, Post kernicterus 2, Hypocalcaemia 2, IEM 1, Encephalitis 1, Trauma 1, Unprovoked 6.

Conclusion: Fever provoked seizures do occur in young infants (aged 1 to 6 months) and are second most common cause of seizures in this age group.

Date of Submission: 03-04-2023

Date of Acceptance: 16-04-2023

I. Introduction:

Seizure episodes are a result of excessive electrical discharges in a group of brain cells. Different parts of the brain can be the site of such discharges. Seizures can vary from the briefest lapses of attention or muscle jerks to severe and prolonged convulsions(1). Seizures are one of the most common neurological symptoms that occur in infancy and childhood. They represent many different disorders with many different causes. Neonatal seizures occur in ~1.5% of neonates, febrile seizures in 2-4% of young children, and epilepsy in up to 1% of children and adolescents(2). In the intensive care unit, seizures are the most frequent neurological sign and occur in their majority in close temporal relation to an acute brain injury or systemic insult, with or without identifiable structural abnormalities. These events are defined as acute symptomatic or provoked seizures. Although these two terms are often used interchangeably, acute symptomatic seizures are in fact defined as resulting from an acute brain injury, such as stroke, trauma or brain infection, whereas provoked seizures are defined as resulting from transient and reversible brain alterations of metabolic or toxic origin(3). Though less frequently, unprovoked seizures may also present in the neonatal period (4). These are defined as seizures occurring in the absence of a potentially causative clinical condition or beyond the interval estimated for the occurrence of acute symptomatic seizures(5). Unprovoked seizures can be secondary to structural brain abnormalities, such as malformations of cortical development and prenatal ischemic lesions(6). Thus corresponding to structural epilepsies, or to genetic conditions, such as ion channel and vitamin-dependent disorders, thus corresponding to genetic epilepsies(7). , epilepsy is considered to be present when 2 or more unprovoked seizures occur in a time frame of longer than 24 hr. Approximately 4-10% of children experience at least 1 seizure (febrile or afebrile) in the 1st 16 yr. of life. The cumulative lifetime incidence of epilepsy is 3%, and more than half of the cases start in childhood. Serious causes meningitis, systemic sepsis, unintentional or non accidental intentional head trauma, and ingestion of drugs of abuse or accidental ingestion of drugs or of other toxins.

II. Methods:

Ours was a prospective study. We analysed aetiology of the seizures in 109, young infants aged 1 month to 6 months, who were admitted in the PICU of a tertiary care children hospital in Kashmir over a period of 2 years from 2016 to 2018. They were followed for 5 years to look for development of epilepsy or febrile seizures. Detailed history & physical examination, all baseline investigations, USG cranium & EEG were done in all cases. CSF examination was done only in febrile young infants. A patient was counted only once if he had recurrent hospitalizations for the same type of seizure.

III. Results:

Most common cause of seizures in young infants was the sequelae of birth asphyxia. Most of these infants had HIE 2 at the time of birth along with seizures and developed cerebral palsy. Only 2 had cerebral palsy due to kernicterus. They were already on anticonvulsants but developed breakthrough seizures. Other causes were meningoencephalitis, advanced shock induced hypoxic ischemic brain injury, trauma, metabolic disturbances, infantile spasms. Eight babies had unprovoked seizures, 17 babies had fever & seizures with no other cause were labelled as fever provoked seizures on follow up.

Cause of seizure	Number of cases
Post Perinatal asphyxia/Cerebral palsy	60
Circulatory shock	9
Hypoglycaemia	5
Meningitis	5
Post kernicterus	2
Hypocalcaemia	2
IEM	1
Encephalitis	1
Trauma	1
Unprovoked	6
Fever provoked	17

Most interesting thing was fever provoked seizures found in the 17 babies. All other causes like meningitis, metabolic disturbances were excluded before labelling them as fever provoked. These babies had developed seizures when they were stable and feeding well. They were usually in the age group of 2 to 3 months.

Age of babies	1 to 2 months	2 to 3 months	3 to 4 months	4 to 5 months	5 to 6 months
Number of babies having fever provoked seizure	2	11	3	1	0

Most of them had minor infections and 2 had vaccine induced fever (post LPV).

Cause of fever	Number of cases
Upper respiratory infection	11
Acute gastroenteritis	3
LPV vaccine	2
UTI	1

IV. Discussion:

Seizures are the most common neurological emergency in infants. They demand immediate control as well as identification and management of the cause. While most of the causes of seizures like cerebral palsy, epilepsy, unprovoked, metabolic, IEM, febrile seizures are well described; we noticed an undescribed entity "fever provoked seizure in young infants". Most of the unprovoked seizures (4 out of 6) developed epilepsy on subsequent follow up. Fever provoked seizure was the second most common cause of seizures in this age group surpassed only by post birth asphyxia/cerebral palsy. It is worth to mention here that fever provoked seizures in babies aged 6 months to 5 years is a well known and common entity often simply called febrile seizure but fever provoked seizures in young infants aged 1 to 6 months has not been described yet. Every fever associated seizure in a young infant must be investigated fully before labelling it as a fever provoked. CSF examination and USG cranium should never be missed in a fever provoked seizure. Common causes of fever in fever provoked seizure include upper respiratory infection, acute gastroenteritis and urinary tract infection. Septic screen must be done in all such cases even if there is an apparent minor infection. Fever provoked seizures were more common in infants aged 2 to 3 months possibly because of neuronal hyper excitability, immature myelination or immature control mechanisms of seizures (8). This type of seizure was falsely labelled as thiamine deficiency even when thiamine levels were normal (9). These infants had generalized clonic seizures with sudden deterioration to shock if seizures were not urgently controlled. They were active & well feeding with minor infections when the seizures developed; they developed seizures before deterioration and seizures were the cause of sudden deterioration. Most of these had presented in inter ictal state of drowsiness or encephalopathy & only 5 were alert on presentation. Seven of them were received in a state of shock with cardiac failure & hepatosplenomegaly. Two of them developed shock with cardiac failure during hospitalization because of

recurrent seizures. All of them had acidosis which was severe in cases with shock. Ten had grunting at presentation and 2 who developed shock during stay also developed grunting. Fifteen of them survived & were discharged fully recovered; only 2 expired although total of 7 required ventilatory support. Anticonvulsants were stopped on discharge because of full recovery, lack of past history of seizures and normal investigations. Follow up over a period of 5 years showed that all of them had normal development although 4 of them had febrile seizures later on.

V. Conclusion:

Fever provoked seizures do occur in young infants (aged 1 to 6 months) and are second most common cause of seizures in this age group. We must rule out all causes of seizures especially CNS infection before labelling a young infant with fever and seizures as fever provoked seizure.

Bibliography:

- [1]. <https://www.who.int/news-room/fact-sheets/detail/epilepsy>
- [2]. Berg AT, Jallon P, Preux PM. The epidemiology of seizure disorders in infancy and childhood: definitions and classifications. *Handb Clin Neurol*. 2013;111:391-8. Doi: 10.1016/B978-0-444-52891-9.00043-9. PMID: 23622188.
- [3]. Gunawardane, N., Fields, M. Acute Symptomatic Seizures and Provoked Seizures: to Treat or Not to Treat?. *Curr Treat Options Neurol* 20, 41 (2018). <https://doi.org/10.1007/s11940-018-0525-2>.
- [4]. Ramantani G, Schmitt B, Plecko B, Pressler R.M, Wohlrab G, Klebermass-Schrehof K. et al, Neonatal seizures-are we there yet?: *Neuropediatrics*. 2019; 50: 280-293 <https://doi.org/10.1055/s-0039-1693149>.
- [5]. <https://doi.org/10.1055/s-0039-1693149>.
- [6]. Beghi E, Carpio A, Forsgren L, Hesdorffer D.C, Malmgren K, Sander J.W. et al.
- [7]. Recommendation for a definition of acute symptomatic seizure.
- [8]. *Epilepsia*. 2010; 51: 671-675
- [9]. Kadish NE, Bast T, Reuner G, Wagner K, Mayer H, Schubert-Bast S, Wiegand G, Strobl K, Brandt A, Korinthenberg R, van Velthoven V, Schulze-Bonhage A, Zentner J, Ramantani G. Epilepsy Surgery in the First 3 Years of Life: Predictors of Seizure Freedom and Cognitive Development. *Neurosurgery*. 2019 Jun 1;84(6):E368-E377. Doi: 10.1093/neuros/nyy376. PMID: 30137548.
- [10]. Scheffer I.E, Berkovic S, Capovilla G, Connolly M.B, French J, Guilhoto L, et al, ILAE classification of the epilepsies: position paper of the ILAE commission for classification and terminology. *Epilepsia*. 2017; 58: 512-521 <https://doi.org/10.1111/epi.13709>
- [11]. Pavone Piero, Pappalardo Xena Giada, Parano Enrico, Falsaperla Raffaele, Marino Simona Domenica, Fink John Kane, Ruggieri Martino. Fever-Associated Seizures or Epilepsy: An Overview of Old and Recent Literature Acquisitions. *Frontiers in Pediatrics* 2022 v 10. DOI=10.3389/fped.2022.858945
- [12]. Qureshi UA, Bhat AS, Qureshi U, Ahmad K, Wani NA, Bashir A, Akram M. Infantile thiamine deficiency: Redefining the clinical patterns. *Nutrition*. 2021 Apr;84:111097. Doi: 10.1016/j.nut.2020.111097. Epub 2020 Nov 29. PMID: 33461052.

XXXXXX, et. al. "Fever provoked seizures in young infants aged 1 to 6 months; an undescribed entity". *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(4), 2023, pp. 01-03.