NIGERIAN JOURNAL OF PAEDIATRICS

https://www.njpaediatrics.com

PRINT: ISSN 0302-4660

ONLINE: ISSN 2814-2985

OFFICIAL JOURNAL OF THE PAEDIATRIC ASSOCIATION OF NIGERIA

VOLUME 52
NUMBER 4
OCTOBER - DECEMBER 2025

CASE REPORT

Nigerian Journal of Paediatrics 2025; Volume 52(4):387-392.
https://dx.doi.org/10.63270/njp.v52i4.2000039.

Post-Lightning-Strike Psychogenic Non-Epileptic Seizure: A Case Report

Okafor Amarachukwu F[1], Ekekwe Nkechi R[1], Enwereji Ngozi U[2], Ndubisi Kennedy N[1], Ukpabi Ihuoma K[1]

[1]Department of Paediatrics, Federal Medical Centre, Umuahia, Nigeria.
[2]Department of Paediatrics, Gregory University, Uturu, Nigeria.

Correspondence
Dr Okafor Amarachukwu. Department of Paediatrics, Federal Medical Centre, Umuahia. P.M.B 7001, Umuahia, Abia State. E-mail: amarafan@yahoo.co.uk ; ORCID - https://ORCID.org/0000-0002-4427-9280.

Abstract

Psychogenic Non-Epileptic Seizures (PNES) are paroxysmal spells which bear a semblance to an epileptic seizure. Neurobehavioral complications following lightning strikes are frequent and resemble the symptoms of patients with traumatic brain injury. We describe the case of a 9-year-old boy who was struck by lightning while playing by the door of his classroom during a thunderstorm. He fell and was unconscious for about 20 minutes, after which he woke up with no significant injuries. The immediate effect of the attack on the patient's organs was not identified, as he was not taken to a health facility for review immediately after the attack. However, four days later, he developed persistent myoclonic jerks of several episodes per day, with varying durations and intervals, which could be induced by touch, noise and light. It is sometimes associated with loss of consciousness. Physical examination of the patient did not reveal any neurologic deficit. A 24-hour Long-Term Video Electroencephalogram Monitoring (LTVEM) done showed a normal study with photic-induced non-epileptic generalised myoclonus. Therefore, the diagnosis of trauma-induced stimulus-sensitive Psychogenic Myoclonus, a type of PNES, was entertained. The child responded to oral Clonazepam and Levetiracetam and was sent for physiotherapy and child psychology review before he was lost to follow-up. In conclusion, exposure to lightning injuries requires a holistic approach to their management, and the resultant seizures may not always be of cranial origin.

Keywords: Long-Term Video Electroencephalogram Monitoring, Lightning, Myoclonus, Non-Epileptic Seizure, Psychogenic Seizure.

Introduction

Psychogenic Non-Epileptic Seizures (PNES) are paroxysmal spells which bear a semblance to an epileptic seizure.[1] PNES and epileptic seizures often present with similar clinical manifestations, posing a diagnostic challenge for clinicians. PNES, previously referred to as pseudoseizures, are paroxysmal events resembling epileptic seizures but lack electrographic evidence of epileptic activity.[2] Limited guidance exists regarding the assessment and management of psychogenic non-epileptic seizures (PNES) in children. Therefore, the International League Against Epilepsy (ILAE) developed consensus-based recommendations to fill this gap.[3] Rarely is a non-epileptic event intentional, in which case it could be due to factitious disorder or malingering, but by definition, PNES are never intentional.[4] Patients and healthcare practitioners are prone to misinterpreting PNES as indicating that the

patient is "faking" the events when the events are involuntary behavioural responses.[4]

Neurobehavioral complications following lightning strikes are frequent and resemble the symptoms of patients with traumatic brain injury.[5] However, evidence of lightning injuries is restricted to case reports and series and non-systematic reviews.[6,7] A bolt of lightning can carry a voltage exceeding 10 million volts with a massive current typically between 30 thousand and 110 thousand amperes. Lightning can be both negatively and positively charged and can take the form of both direct and alternating current.[8] Not all lightning injuries are classified as a direct strike; it can be a side splash, contact injury, or ground current. Direct strikes are rare, accounting for only 5% of documented lightning injuries.[8] Inflammatory damage to the nervous system due to lightning injuries can be a serious problem for patients exposed to lightning attacks, with hypoxic encephalopathy due to cardiac arrest as the primary cause of death.[9] Patients with spinal cord lesions are likely to have permanent sequelae and paralysis.[9] The technology for detecting lightning, which is a wideband magnetic direction finder, helps establish lightning-flash densities, though not readily available in resource-limited settings.

Myoclonus refers to sudden, brief involuntary twitching or jerking of a muscle or group of muscles. The twitching cannot be stopped or controlled by the person experiencing it. Myoclonus is not a disease itself; instead, it describes a clinical sign which can be physiologic or pathologic.[10] This report aims to create awareness concerning this rare effect of lightning strike on the central nervous system, particularly, non- epileptic myoclonus.

Case Presentation

A nine-year-old boy who was struck by lightning during a thunderstorm while playing by the door of his classroom was brought to the Child Neurology Specialist Clinic of the Federal Medical Centre, Umuahia, Abia State, Nigeria. He reportedly fell and was unconscious for about 20 minutes, after which he woke up with no significant injuries. The immediate effect of the attack on the boy's organs was not identified, as the child was not taken to a health facility for review immediately after the attack. However, four days later, he developed persistent myoclonic jerks of several episodes per day with varying durations and intervals, which can be induced by touch, noise and light. It was occasionally associated with loss of consciousness. Physical examination did not reveal any significant findings.

A 24-hour Long-Term Video Electroencephalogram Monitoring (LTVEM) done showed a normal study with no epileptiform discharges and photic-stimulated non-epileptic generalised myoclonus. Complete Blood count was essentially normal, while the serum electrolytes, urea and creatinine were normal except for mild hypocalcaemia, which was appropriately treated. Electromyography (EMG) was not done due to the unavailability of the equipment. A brain MRI was not done due to severe financial constraints. Hence, the diagnosis of trauma-induced, stimulus-sensitive Psychogenic Myoclonus, a type of PNES, was entertained. The child responded to oral Clonazepam and Levetiracetam. He also had follow-up physiotherapy and psychology sessions after he visited the Paediatric Neurology Clinic. However, he was lost to follow-up due to financial constraints.

Written consent and assent were obtained from the child's parents and the child, respectively, for the use of the child's data in this research. The parents of the child initially felt the thunder strike was a spiritual attack hence, they were sceptical about medical management. They were later convinced to visit the hospital by a relative who

is a medical practitioner when the myoclonus worsened.

Discussion

PNES, previously referred to as pseudoseizures, are paroxysmal events resembling epileptic seizures but lack electrographic evidence of epileptic activity. [5] Myoclonus and other jerky movement disorders are hyperkinetic disorders, the diagnosis of which relies heavily on clinical neurophysiological testing. However, formal diagnostic criteria are lacking, and recently, the utility and reliability of these tests have been questioned. [6]

Myoclonus and other jerky movement disorders are hyperkinetic disorders. The diagnosis of these disorders depends on clinical neurophysiological testing such as electroencephalogram (EEG), electromyography (EMG) and nerve conduction studies.

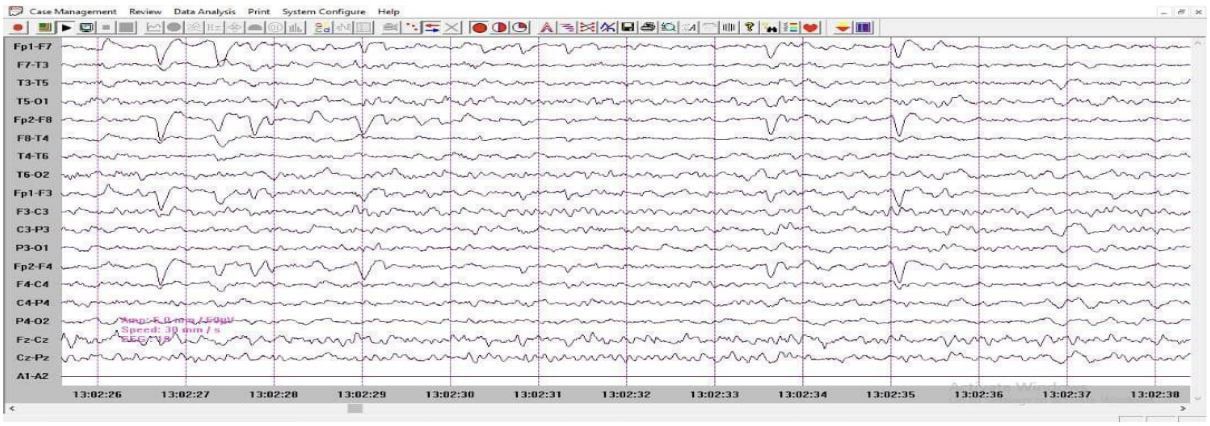

Figure 1: The electroencephalograph showing a normal background in between attacks.

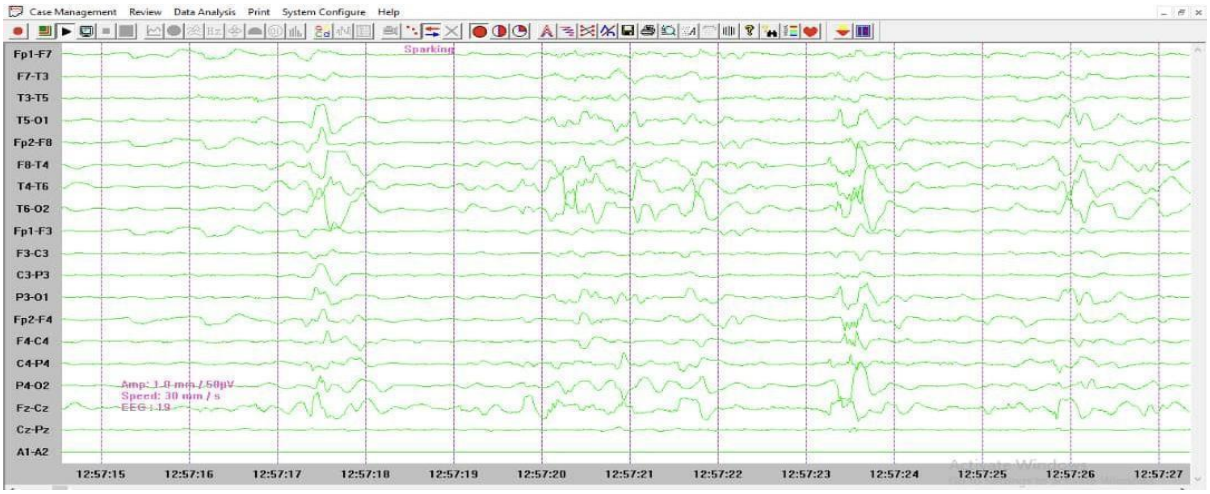

Figure 2: The electroencephalograph showing only movement artefacts during a photo-stimulated attack.

Damage to the nervous system can be a serious problem for patients struck by lightning, with hypoxic encephalopathy due to cardiac arrest as the major cause of death. [9] The index case did not present to any health facility on the day of the lightning strike; hence, there was no identified clinical or laboratory evidence of immediate pathological or clinical effect of lightning injuries on him. The intermittent myoclonus was observed four days after the incident. Physical examination on presentation to our facility one month after the incident, showed no neurological

deficits. He had intermittent myoclonus, sometimes spontaneous and sometimes induced by touch, light, or noise. Myoclonus, which can be clinically identified, usually results from a disruption of the neurological activities of the brain or spinal cord. It can also occur after peripheral nerve injury.[10] It could be either epileptic (cortical) or non-epileptic. Electrophysiological tests are invaluable in determining whether myoclonus is cortical, subcortical or spinal.[11]

A electroencephalogram (EEG) is an essential tool for studying the brain's electrical activity and is primarily a paraclinical tool for seizure evaluation.[12,13] It is helpful for the classification of seizure types, assessing comatose patients in the intensive care unit, and evaluating encephalopathies, among other indications. [14 -16] The index case did not have any time-locked epileptiform discharges during the myoclonic events. This shows that the myoclonus was non-cortical. In cortical (epileptic) myoclonus, the patient often has central spikes on the EEG. At the same time, in Juvenile Myoclonic Epilepsy (JME), EEG shows jerk-locked polyspike complexes with a frontal maximum transient that precedes the myoclonic jerk by 10 milliseconds. These help in differentiating an epileptic/cortical myoclonus from a psychogenic non-epileptic myoclonus.[16] Non-epileptic seizures are not caused by the excessive synchronous cortical electroencephalographic activity that defines epileptic seizures, hence both physiologic and psychogenic origins of attacks are subsumed under the general term non-epileptic events.[17]

A psychogenic aetiology of myoclonus can give rise to phenomena difficult to distinguish from the organic aetiologies of myoclonus.[18] Even though a Brain MRI was not done and the child defaulted from further follow-up care, physical examination of the index case did not show any neurological deficits, and the VEEG showed no time-locked epileptiform discharges with the myoclonic events. This is in keeping with a functional/psychogenic seizure. Certain factors are generally accepted as the risk factors of PNES; these include trauma or other acute stressors.[4] A non-inclusive list of comorbid disorders conveying increased risk encompasses functional or dissociative disorders, post-traumatic stress disorder, mood and personality disorders, concomitant epilepsy, mild head injury, sleep disorders, migraine headaches, pain disorders, and even asthma.[4]

Evidence of immediate lightning injuries includes keraunoparalysis (temporary paralysis with sensory deficits), loss of consciousness, amnesia, confusion, seizures, headaches, peripheral neuropathy, and neurocognitive issues like memory impairment and attention deficits.[19] Some of these features, such as loss of consciousness, confusion and non-epileptic seizures, were noted in the index case; however, there were no features of peripheral neuropathies or neurocognitive disorders. Delayed neurologic sequelae such as chronic pain, sleep disturbances, anxiety, and post-traumatic stress disorder (PTSD) can also occur. These symptoms are the effects of inflammatory damage to the brain, autonomic nervous system, and peripheral nerves, which can be transient or permanent.[19] The index case did not complain of chronic pain but had anxiety and evident post-traumatic stress disorder (PTSD).

Concerning the treatment of non-epileptic myoclonus, a single pharmacological agent rarely controls myoclonus as observed in the index case; therefore, polytherapy with a combination of drugs, often in large dosages, is usually necessary. [10] Myoclonus, whether cranial of or extracranial in origin, is notoriously refractory to pharmacotherapy. It is a near-maxim that the aetiology of the myoclonus must drive the treatment choice.[20]

Conclusion

Lightning injuries require a holistic approach to their management, and the resultant seizures may not always be of cranial origin.

Authors' Contributions: OAF conceived the research. ENR and UIK curated the data. OAF drafted the manuscript, and OAF and UIK revised it for sound intellectual content. All the authors approved the final version of the manuscript.
Conflicts of Interest: None declared.
Funding Supports: The researchers did not receive financial support for the research or the preparation of the manuscript. **Accepted for publication:** 20th November 2025.

References

1. Gathers-Hutchins, Hara Stephanou. Psychogenic non-epileptic seizures in children. *Current Problems Pediatr Adolesc Health Care* 2021;51:7.101036.
2. LaFrance WC Jr, Baker GA, Duncan R, Goldstein LH, Reuber M. Minimum requirements for the diagnosis of psychogenic non-epileptic seizures: a staged approach: a report from the International League Against Epilepsy Non-epileptic Seizures Task Force. *Epilepsia*. 2013;54:2005–18. https://doi.org/10.1111/epi.12356
3. Reilly C, Jette N, Johnson EC, Kariuki SM, Meredith F, Wirrell E, *et al.* Scoping review and expert-based consensus recommendations for assessment and management of psychogenic non-epileptic (functional) seizures (PNES) in children: A report from the Pediatric Psychiatric Issues Task Force of the International League Against Epilepsy. *Epilepsia*. 2023;64(12):3160-95. https://doi.org/10.1111/epi.17768
4. Huff JS, Lui F, Murr NI. Psychogenic Non-epileptic Seizures. StatPearls [Internet] Treasure Island (FL): *StatPearls* Publishing; Feb 2024. https://www.ncbi.nlm.nih.gov/books/NBK441871/
5. Cherington M. Neurologic manifestations of lightning strikes. *Neurology* 2003;60(2):182-5. https://doi.org/10.1212/01.WNL.0000033801.15204.B5
6. Outaghyame O, Benabbouha A, Bazine A, Elhjouji A. Seizure, A Shocking Effect of a Lightning Strike on Aerodrome: A Case Report. *Air Med J.* 2024;43(2):168-70. https://doi.org/10.1016/j.amj.2023.11.003
7. Van Ruler, R · Eikendal, T · Kooij, FO. A shocking injury: a clinical review of lightning injuries highlighting pitfalls and a treatment protocol. *Injury* 2022;53:3070-7.
8. Jensen JD, Thurman J, Vincent AL. Lightning injuries. *StatPearls* [Internet]. Treasure Island (FL). StatPearls Publishing: July 2023. https://www.ncbi.nlm.nih.gov/books/NBK441920/
9. Cherington M, Yarnell PR, London SF. Neurologic complications of lightning injuries. *West J Med.* 1995;162(5):413-7.
10. National Institute of Neurological Disorders and Stroke (NINDS): Myoclonus. https://www.ninds.nih.gov/health-information/disorders/myoclonus (Accessed 15/01/2025)
11. Latorre A, Ganos C, Hamada M, Phielipp N, Rocchi L, Merchant S, *et al.* Diagnostic Utility of Clinical Neurophysiology in Jerky Movement Disorders: A review from the MDS Clinical Neurophysiology study group. *Movement Diso Clin Pract* 2024;12(3):272-284. https://doi.org/10.1002/mdc3.14306
12. Kojovic M, Cordivari C, Bhatia K. Myoclonic disorders: a practical approach for diagnosis and treatment. *Ther Adv Neurol Disord*. 2011;4(1):47-62. https://doi.org/10.1177/1756285610395653
13. Rayi A, Murr NI. Electroencephalogram.2022. In: StatPearls [Internet], Treasure Island (FL): StatPearls Publishing; 2025 January. Available from: https://www.ncbi.nlm.nih.gov/books/NBK563295/ (Accessed 20/2/2025) https://pubmed.ncbi.nlm.nih.gov/33085442 (Accessed 20/2/2025)

14. Olubunmi AO. Epilepsy in Nigeria – A review of etiology, epidemiology and management. *Benin J Postgrad Med* 2006;8(1):27-51.
15. Tatum WO, Mani J, Jin K, Halford JJ, Gloss D, Fahoum F, Maillard L, *et al.* Minimum standards for in patient long-term video-EEG monitoring: A clinical practice guideline of the international league against epilepsy and international federation of clinical neurophysiology. *Clin Neurophysiol.* 2022;134:111-28.
16. Britton JW, Frey LC, Hopp JL, Korb P, Koubeissi MZ, Lievens WE, *et al*. Electroencephalography (EEG): An introductory text and atlas of normal and abnormal findings in adults, children, and infants. *St Louis EK, Frey LC, editors.* Chicago: American Epilepsy Society. 2016.
17. Krauss GL, Mathews GC, Similarities in Mechanisms and Treatments for Epileptic and Non-epileptic Myoclonus. *Epilepsy Curr* 2003;3(1):19-21. https://doi.org/10.1111/j.1535-7597.2003.03107.x.
18. Sanders AE, Zafar N, Sharma S. Myoclonus. *StatPearls* [Internet]. Treasure Island (FL). StatPearls Publishing: Feb 2024.
19. Runde PR, Birnbaumer DM. Lightning Injuries. *MSD Manual* (Professional version) 2024. https://www.msdmanuals.com/professional/content/permissions (Accessed Oct 2025)
20. Pena AB, Caviness JN. Physiology-based treatment of myoclonus. *Neurotherap*. 2020;17(4):1665-80.