Case Report
Journal of Epilepsy Research
pISSN 2233-6249 / eISSN 2233-6257

Laughter-Induced Seizures: A Rare Type of Reflex Epilepsy

Hussein Algahtani, MD, FRCPC, MMed[1], Bader Shirah, MD[2], Sarah Algahtani, MS[3], Nawal Abdelgaffar, MD[1,4]

[1]Department of Medicine, Aseer Central Hospital, Abha; [2]Department of Neuroscience, King Faisal Specialist Hospital & Research Centre, Jeddah; [3]Department of Medicine, Ibn Sina National College For Medical Studies, Jeddah, Saudi Arabia, [4]Department of Neurology, Kasr Al Ainy Hospital, Faculty of Medicine, Cairo University, Cairo, Egypt

Received March 6, 2024
Revised March 25, 2024
Accepted April 26, 2024

Corresponding author:
Hussein Algahtani, MD, FRCPC, MMed
Department of Medicine, Aseer Central Hospital, Al Rabwah, Abha 62523, Saudi Arabia
Tel. +966556633130
E-mail; halgahtani@hotmail.com

This research explores the rare occurrence of laughter-induced seizures, a form of reflex epilepsy documented in only one previous case in the literature. The patient, free from prior medical or neuropsychiatric history, exhibited seizures triggered solely by laughter. Electroencephalography and neuroimaging revealed normal results. Despite declining medical therapy, lifestyle modifications enabled seizure management. The study emphasizes the dearth of data on laughter-induced seizures, prompting the consideration of multimodal strategies for treatment. Further research is imperative to unveil the precise pathophysiology and establish standardized therapeutic approaches for this uncommon epileptic manifestation. **(2024;14:50-51)**

Key words: Laughter, Seizures, Reflex epilepsy

Introduction

Reflex seizures are a group of seizures that are triggered by specific stimuli such as light (photosensitive epilepsy), music (musiogenic seizures), sound (startle-induced tonic or atonic seizures), and food (eating-induced seizures).[1] Laughter-induced seizures represent an exceedingly rare phenomenon, often susceptible to misdiagnosis and potential oversight.[2] Laughter seizures were initially documented by Trousseau[3] in 1877 as brief unprovoked bursts of laughter lasting only moments. In contrast to laughter seizures, our study presents a compelling and exceptionally rare case involving laughter-induced seizures.

Case Report

A 45-year-old male, devoid of any prior medical or neuropsychiatric history, exhibited recurrent seizures exclusively induced by laughter. These episodes, spanning several years, were consistently triggered during moments of amusement, such as watching comedic content on television or engaging in humorous conversations with friends or family. He described no aura or warning, and attacks were sudden and embarrassing. Each seizure episode, lasting approximately 1 to 2 minutes, was characterized by loss of consciousness with generalized body shaking and tongue biting. While the patient did not experience bowel or bladder incontinence, he sustained injuries, including shoulder dislocation and muscle trauma, during these episodes. Postictally, he reported feelings of fatigue and exhaustion that lasted several hours. Notably, there was no familial history of epilepsy, and the patient's social background was unremarkable with no history of alcohol or recreational drug abuse.

Physical examination revealed a seemingly normal, obese gentleman with normal vital signs, and both respiratory and cardiovascular examinations yielded normal results. Neurological examination, encompassing higher mental functions, cranial nerves, motor and sensory functions, and cerebellar assessments, exhibited no abnormalities. The ophthalmological assessment showed normal optic disks bilaterally with no evidence of papilledema or visual field defect.

Metabolic and chemical investigations, covering electrolytes, glucose, renal functions, liver profile, and hormonal assays, all fell within normal ranges. Detailed cardiac investigations including echocardiography, Holter monitoring, and 24-hour blood pressure monitoring were unremarkable. Multiple routine and sleep-deprived electroencephalography (EEG) sessions produced normal results. Despite recommendations for admission to an epilepsy monitoring unit for video EEG monitoring, the patient declined.

Remarkably, the patient adamantly reported that laughter was the exclusive trigger for his seizures, denying any occurrences during sleep or without laughter. He chose to abstain from antiepileptic

medications, opting instead to modify his social life by avoiding events likely to induce laughter. Consequently, he continued to experience an average of three to four laughter-induced seizures annually, highlighting the unique nature of this intriguing case.

Discussion

Laughter, a distinctly human characteristic, is recognized for its positive impact on overall well-being.[4] The phenomenon of laughter, recognized as a universal human social gesture, typically emerges in infancy around 2-3 months as an expression of joy or happiness. It is a complex, instinctive, and spontaneous process influenced by various audiovisual factors. The neural basis of normal laughter involves intricate interactions among the frontal and temporal neocortex, temporobasal cortex, olfactory, visual, and auditory associational areas, the limbic system, the cingulum, and the brainstem. Two partially independent neuronal pathways govern the expression of laughter: the involuntary system, involving amygdaloid, thalamic, and subthalamic areas, and the dorsal tegmental brainstem; and the voluntary system, originating in the premotor/frontal opercular areas, traversing the motor cortex and pyramidal tract to the ventral brainstem. Additional brain areas are well known to contribute to controlling facial, vocal, and respiratory movements during laughter.[5]

Normal laughter is a behavioral response to pleasant emotions, fostering friendly interactions. In contrast, pathological laughter is disproportionate to emotional context, often lacking provocation. Conditions like gelastic seizures and pseudobulbar palsy are associated with pathological laughter. Gelastic seizures, characterized by inappropriate, mirthless laughter, are commonly linked to hypothalamic hamartoma, and with other lesions reported in frontal or temporal lobes.[4] Our case, a laugh-induced seizure, differs from gelastic seizures as laughter provokes the seizures, and presenting a rare phenomenon with only one prior case documented in the literature.

Neuroimaging in our case revealed normal results, which excluded the possibility of tumors or heterotopias in the areas involved in the circuits of laughing. More advanced imaging techniques such as functional magnetic resonance imaging or positron emission tomography scan (which were not available in our center) may be helpful in such a case to delineate the pathophysiology and etiology of laugh-induced seizures. Routine EEGs were inconclusive due to the inability to induce deep belly laughter. The patient declined necessary video EEG monitoring, complicating electrophysiological confirmation. Despite a refusal of medical therapy, the patient managed seizures by avoiding laughter-triggering events, posing a challenge for standard treatment establishment. Further studies are needed to confirm or refute this localization hypothesis.

This investigation sheds light on the exceptionally rare phenomenon of laughter-induced seizures, a distinct form of reflex epilepsy with only one previous case reported in the literature. The concept of reflex seizures triggered by specific stimuli aligns with our patient's unique condition, where laughter serves as the exclusive trigger. This laughter-induced seizure, an exceedingly rare type of epilepsy, profoundly impacts the quality of life, and particularly affecting a fundamental aspect of human experience. The study underscores the necessity for additional research to unravel the exact pathophysiology and establish standardized therapeutic approaches for this unique and challenging epileptic condition.

Conflict of Interest

The authors declare that they have no conflicts of interest.

References

1. Hanif S, Musick ST. Reflex epilepsy. *Aging Dis* 2021;12:1010-20.
2. Mainali NR, Jalota L, Aryal MR, Schmidt TR, Badal M, Alweis R. Laugh-induced seizure: a case report. *J Med Case Rep* 2013;7:123.
3. Trousseau A. Clinique médicale de l'Hôtel-Dieu de Paris. 2nd ed. London: Baillière, 1877;89-155.
4. Beckwith NL, Khil JC, Teng J, Liow KK, Smith A, Luna J. Inappropriate laughter and behaviours: how, what, and why? Case of an adult with undiagnosed gelastic seizure with hypothalamic hamartoma. *Hawaii J Med Public Health* 2018;77:319-24.
5. Zauli FM, Del Vecchio M, Russo S, et al. The web of laughter: frontal and limbic projections of the anterior cingulate cortex revealed by cortico-cortical evoked potential from sites eliciting laughter. *Philos Trans R Soc Lond B Biol Sci* 2022;377:20210180.