Epilepsy & Behavior 16 (2009) 360–365

Contents lists available at ScienceDirect

Epilepsy & Behavior

journal homepage: www.elsevier.com/locate/yebeh

Case Report

Gelastic epilepsy and dysprosodia in a case of late-onset right frontal seizures ☆

Steven P. Cercy [a,b,*], Joshua E. Kuluva [b,c,d]

[a] Mental Health Service, Veterans Affairs New York Harbor Healthcare System, New York, NY, USA
[b] Department of Psychiatry, New York University School of Medicine, New York, NY, USA
[c] Neurology Service, Veterans Affairs New York Harbor Healthcare System, New York, NY, USA
[d] Department of Neurology, New York University School of Medicine, New York, NY, USA

ARTICLE INFO

Article history:
Received 22 June 2009
Revised 6 August 2009
Accepted 7 August 2009
Available online 3 September 2009

Keywords:
Gelastic seizures
Anticonvulsants
Frontal lobe
Cognition disorders
Speech disorders
Neuropsychology

ABSTRACT

Gelastic epilepsy (GE) is an uncommon type of seizure disorder characterized by stereotyped, unprovoked, inappropriate ictal laughter. GE is most frequently associated with hypothalamic hamartoma, with onset almost invariably occurring during childhood. GE also occurs occasionally with temporal and frontal cortical seizure foci. We describe an unusual case of senescent-onset GE with a right frontal seizure focus. In addition to laughter, dysprosodia was a clinical feature. Clinical and electroencephalographic evidence of seizure activity ceased on levetiracetam, and the patient showed concurrent improvement in cognitive function. We review the evidence for the cerebral representation of laughter and prosody, and discuss issues bearing on the differential diagnosis and management of GE.

Published by Elsevier Inc.

1. Introduction

Gelastic epilepsy (GE) is an uncommon type of seizure disorder in which the primary ictal feature is stereotyped, inappropriate laughter not provoked by external stimuli. Hypothalamic hamartoma (HH) represents the etiology in the vast majority of cases [1,2]. Onset usually occurs during childhood and is associated with precocious puberty, cognitive impairment, behavioral disturbance, and poor response to treatment. GE is also known to occur occasionally with cortical seizure foci. Of those, temporal localization is most frequent; rarely, GE has been reported with seizure foci involving frontal regions. We present an unusual case of senescent-onset GE with a right frontal seizure focus. Clinical and electroencephalographic evidence of seizure activity ceased on levetiracetam, with concurrent improvement in cognitive function. This case provides further support of the dissociability of laughter from subjective mirth, and highlights new evidence of prosodic disturbance associated with focal right hemisphere dysfunction.

2. Case report

2.1. History of present illness

An 83-year-old Caucasian man (L.S.) began demonstrating new-onset cognitive and functional decline concurrent with five documented episodes of stereotyped, inappropriate laughter. According to medical records, early in the course of those changes, he reported to the psychiatrist following him for posttraumatic stress disorder (PTSD) that "I have a funny feeling. I feel as I am not in the world. I am looking at myself from outside my body. At times, I feel like someone else is controlling me". His psychiatrist diagnosed depersonalization disorder. His neighbors noted a decline in self-care and complained of a moldy odor coming from his place of residence. He had been a member of a psychotherapy group for many years and abruptly stopped attending. On one occasion he was observed to be "laughing throughout the morning" in the corner of a hospital-based social club, which was "an unusual presentation for him". He refused intervention, "stating he was 'fine'. He [further] stated 'I don't know' when asked why he was laughing". After several additional similar episodes and continued decline over a period of 6 months, L.S. began screaming in a high-pitched voice while waiting for a medical appointment. A crisis response team found that he was disoriented to time and place, and would not respond to verbal cues. He was admitted to an inpatient psychiatric unit for observation. Over several hours, his mental status returned to baseline, but new-onset atrial flutter was found and he

☆ Portions of this article were presented at the 36th Annual Meeting of the International Neuropsychological Society, Waikoloa, HI, February 2008.

* Corresponding author. Address: Mental Health Service (11M), Veterans Affairs New York Harbor Healthcare System, 423 East 23rd Street, New York, NY 10010, USA. Fax: +1 212 951 3336.
E-mail address: steven.cercy@va.gov (S.P. Cercy).

1525-5050/$ - see front matter Published by Elsevier Inc.
doi:10.1016/j.yebeh.2009.08.007

was transferred to a medical unit for further evaluation. Subsequently, several more episodes of laughter were observed. Each episode lasted approximately 1–2 min and was characterized by high-pitched laughter, facial grimacing, and nonresponsiveness to verbal command. The episodes were not associated with tongue biting, muscle twitching, limb shaking, or urinary incontinence. Between episodes, high-pitched speech lasting 30–60 min was evident intermittently; expressive and receptive language was otherwise grossly unremarkable.

2.2. Prior history

L.S.'s prior medical history was significant for hypertension, hyperlipidemia, first-degree atrioventricular block with superimposed new-onset atrial flutter, peripheral vascular disease, iron-deficiency anemia, basal cell carcinoma, pre-glaucoma, and cervical degenerative disc disease. He had an estimated 75-pack-year history of tobacco use, stopping in the seventh decade of his life. Medications at admission were metoprolol, diltiazem, simvastatin, finasteride, baclofen, and a multivitamin. His prior psychiatric history was notable for dysthymic disorder, posttraumatic stress disorder, generalized anxiety disorder, and obsessive–compulsive disorder; prior to seizure onset, he had been psychiatrically stable for many years. He was taking sertraline at the time of admission. There was no history of alcohol or substance abuse. L.S. has a master's degree and is a retired professional.

2.3. Evaluation and management

On examination, L.S. was a well-nourished gentleman who appeared his reported age. The cranial nerve examination was unremarkable. Motor strength was equal in all extremities and muscle tone was normal. No tremor was evident. Reflexes were symmetric. His plantar response was flexor bilaterally. Magnetic resonance imaging was unremarkable (Fig. 1). Laboratory studies, including thyroid-stimulating hormone, vitamin B_{12}, folate, rapid plasmin reagent, and urine toxicology, were unremarkable.

EEG with Queen Square bipolar montage revealed focal right frontotemporal paroxysmal epileptiform activity. Diffuse slow wave activity was present bilaterally and was more prominent in right frontal leads. Sharp waves superimposed on background slowing occurred selectively in right frontal and frontotemporal leads (Fig. 2). L.S. was started on levetiracetam. He had one additional episode with titration to therapeutic level, and was subsequently seizure free. One-month repeat EEG was normal.

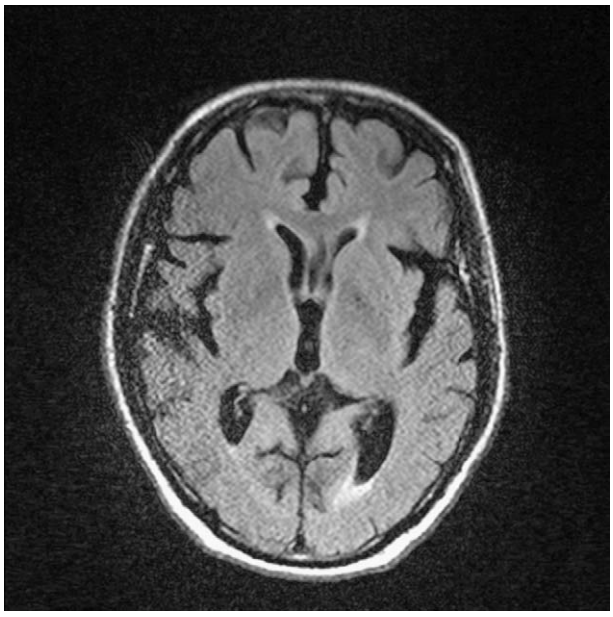

Fig. 1. Representative axial fluid-attenuated inversion–recovery MR image showing mild periventricular hyperintensity and diffuse, age-related volume loss.

Initial neuropsychological evaluation conducted 3 days after starting levetiracetam elicited impairments of visual recognition memory, speed of visual search, cognitive flexibility, and visual abstraction. Visual recall memory, verbal recognition memory, language functions, visuospatial organization, processing speed, and verbal abstraction were deficient. Clinical seizure activity and interictal high-pitched speech were evident during the initial evaluation. Follow-up neuropsychological evaluation 23 days later revealed interval improvements, as determined by calculation of the Reliable Change Index (RCI), in verbal memory, confrontation naming, and processing speed. Trends toward improvement that fell short of statistical reliability were suggested in phonemic fluency and working memory; substantial raw score improvement occurred in visual abstract reasoning (Clock Drawing Test), but available normative data are insufficient to calculate RCI for that measure. Visual memory was unchanged (Table 1).

Once medically stabilized, L.S. was transferred to a subacute skilled nursing facility. He remained on levetiracetam and continued to be seizure free. At that facility, he showed no evidence of altered behavior. Eventually, he was discharged to his home and returned to his baseline level of functioning.

3. Discussion

This case represents a rare manifestation of senescent-onset GE with seizure activity localized to the right frontal region. The patient's seizures responded to anticonvulsant treatment, and cognitive deficits found at initial evaluation improved in association with seizure control. Moreover, the patient showed evidence of abnormal prosody during ictus and the interictal period.

GE is a rare condition estimated to occur in fewer than 0.2% of all epilepsy cases [3]. Seizure localization in GE is overwhelmingly of diencephalic origin, typically in association with HH [1]. Symptom onset almost invariably occurs during childhood, is associated with precocious puberty and significant behavioral disturbance [2], and is frequently refractory to pharmacological and surgical interventions [4]. GE is also known to occur occasionally with cortical seizure foci. As in HH, age at onset typically occurs during childhood [5], but a few adult-onset cases have been reported [6]. Temporal cortex is most frequently involved, whereas frontal cortex has been reported less often [3,7,8]. Conversely, in a case series of patients with frontal lobe epilepsy, 9% had GE [9].

3.1. Dissociation of laughter from mirth: Implications for mechanisms of laughter

Laughter is a universal feature of human behavior posited as representing a complex, situation-specific social signal [10]. Laughter not only is a manifestation of mirth, but is also provoked by aversive emotional states such as anxiety and fear. In certain contexts it may serve as a method of distinguishing play from distress in boisterous interactions, an expression of derision or superiority, a release of inhibition, or even merely as a form of nonverbal punctuation of speech content. Thus, laughter and humor are overlapping but not synonymous phenomena.

The evidence implicating specific cerebral structures and pathways mediating laughter remains inconclusive. Based on evidence from disorders in which pathological laughter is a prominent feature, including GE, pseudobulbar and bulbar palsies, and some