Epilepsy & Behavior Reports 23 (2023) 100609

Contents lists available at ScienceDirect

Epilepsy & Behavior Reports

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

Case Report

Laughter isn't always the best medicine, sometimes it's one of the symptoms

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ARTICLE INFO

Article history:
Received 11 January 2023
Revised 29 May 2023
Accepted 1 June 2023
Available online 6 June 2023

Keywords:
Seizures
Gelastic Seizures
Epilepsy
Hypothalamic Hamartoma
Ganglioglioma

ABSTRACT

Gelastic seizure is a rare type of seizure characterized by bouts of uncontrolled, stereotyped laughter and often associated with hypothalamic hamartomas. In this case study we review a patient with a low grade ganglioglioma in the temporal lobe, a rare type of brain tumor that commonly causes seizures. The 8-year-old ambidextrous patient presented with seizures starting four days prior to presentation, happening multiple times daily and with each seizure lasting for 5–15 s. The patient's neurological examination was normal between episodes, and VEEG recorded ictal laughing events originating focally from the anterior temporal and/or inferior frontal region. Seizures were stopped with Levetiracetam, however given MRI findings surgical intervention was additionally deemed necessary. MRI head with contrast showed 8 mm nodular enhancing lesion located in the anteroventral portion of the right temporal pole with surrounding edema that extended to the anterior margin of the fusiform gyrus. The patient recovered well from surgery with no neurological deficits, is no longer on any antiseizure medications and remains seizure free at 3-year follow-up.

Introduction

Laughter during seizures was first described in 1870s by Trousseau when a patient was unaware of repeated meaningless laughing spells [1]. These went on to be termed gelastic seizures (GS) in the 1950s, and became characterized as a seizure where a patient will experience bouts of uncontrolled, stereotyped laughter without any response to external stimuli, described as laughter that lacks joy [2]. GS are due to activation of frontal and temporal regions independently from the underline etiology [2]. GS are often associated with hypothalamic hamartomas though there is still debate if they are pathognomonic [2]. These types of seizures are typically seen in children, often between the ages of 4 to 10 and can progress to intractable epilepsy [1]. These children typically have other types of seizure semiology, and GS are difficult to control with medication [2]. GS have been reported to be associated with precocious puberty, psychiatric comorbidities, and cognitive difficulties [1]. Several reports have localized GS beyond hypothalamic hamartomas, e.g., biopsy proven neurocysticercosis, hippocampal sclerosis, as well as temporal cortical and frontal cortical dysplasia [2–3]. Autonomic features have been widely recognized which include flushing, tachycardia, and altered respirations [1]. No report focusing on GS associated with ganglioglioma has been reported.

Case description

A previously healthy 8 y/o male presented with new onset spells. Main features were facial grimacing with whimpering (mixture of laughing and crying), pupillary dilation, associated with face and upper body turning red, lasting between 5 and 15 s, followed by a brief period of confusion, running around the room, and then back to baseline in 2 min. There was no recollection of the event. Frequency of the spells had increased a week prior. The child reported having frontal lobe headache as well as urinary incontinence. On presentation, he was mildly encephalopathic, but the rest of the neurological examination was normal. He was monitored on video EEG, and two seizures were recorded. Ictal onset for one seizure appeared to be from right anterior temporal/ inferior frontal and mid temporal (F8, T8), and the other one from right anterior temporal/ inferior frontal region (F8) as seen in Fig. 1. Interictal epileptiform abnormalities typically included spikes, sharp waves and slow-wave complexes. In this patient interictal, EEG showed most frequently right frontal temporal spikes and

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https://doi.org/10.1016/j.ebr.2023.100609
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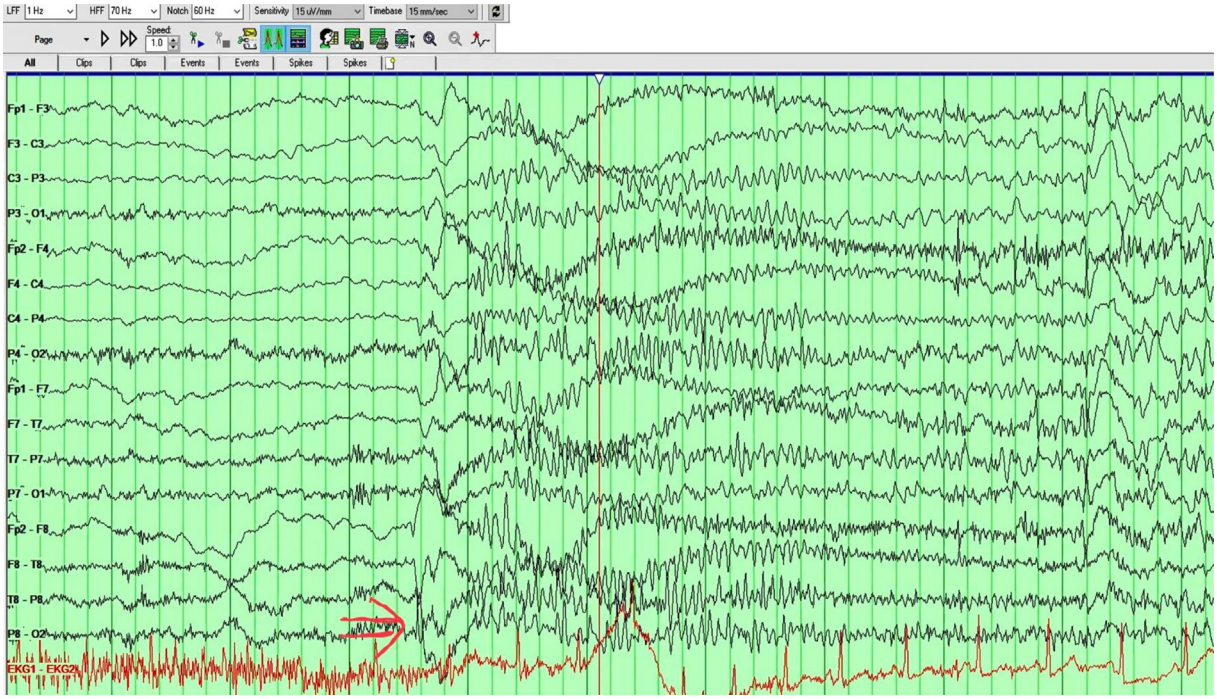

Fig. 1. EEG recording of the patient's seizure activity with a focal seizure seen in the right anterior/mid temporal region.

waves (F4, F8) and less frequently bifrontal spike and wave discharges. There were also rare left frontal sharp waves. Patient was started on Levetiracetam which was effective in stopping seizures, however MRI was scheduled for following day due to the focal findings from the EEG. MRI of the brain showed a temporal lobe tumor located in the anteroventral portion of the right temporal pole with surrounding edema extending to the anterior margin of the fusiform gyrus as seen in Fig. 2. Differential diagnosis was ganglioglioma, pleomorphic xanthoastrocytoma, and dysembryoplastic neuroepithelial tumor. Patient underwent craniotomy

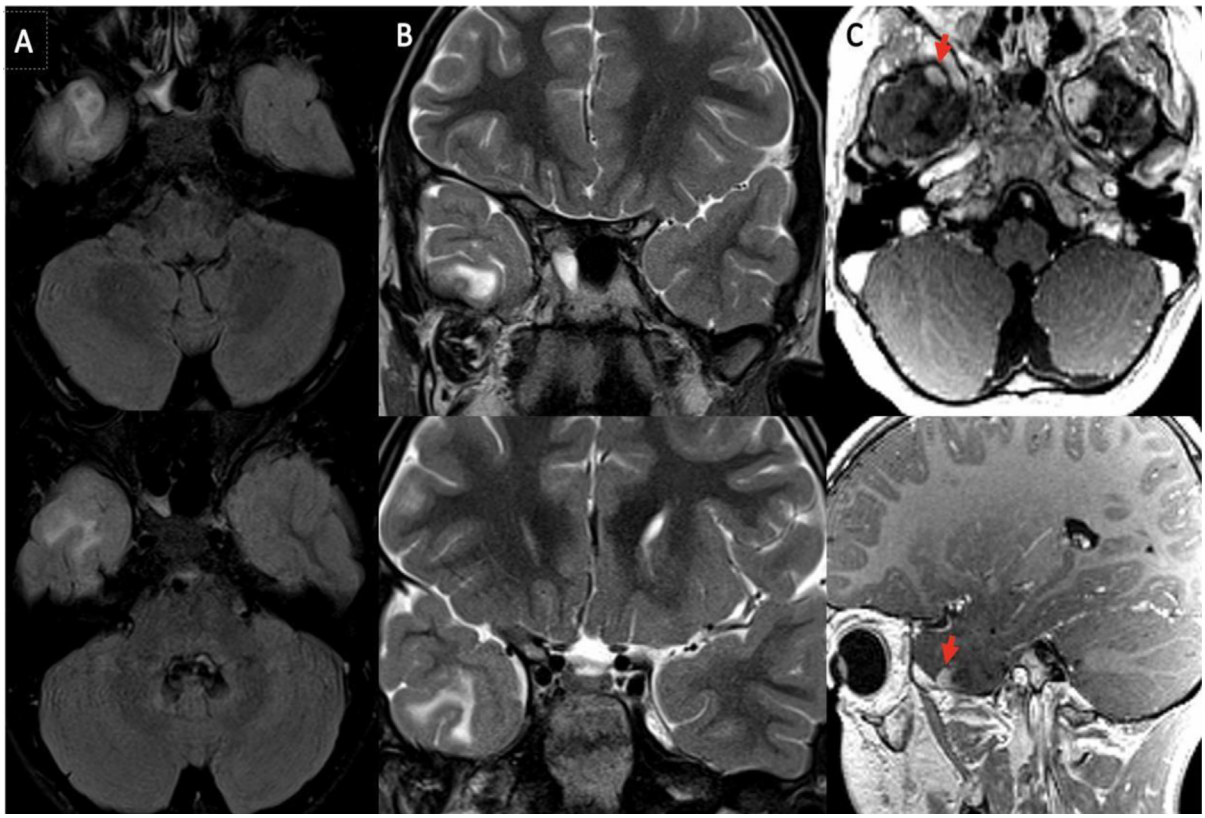

Fig. 2. Brain MRI of temporal lobe tumor. Consecutive slices of axial T2W FLAIR.

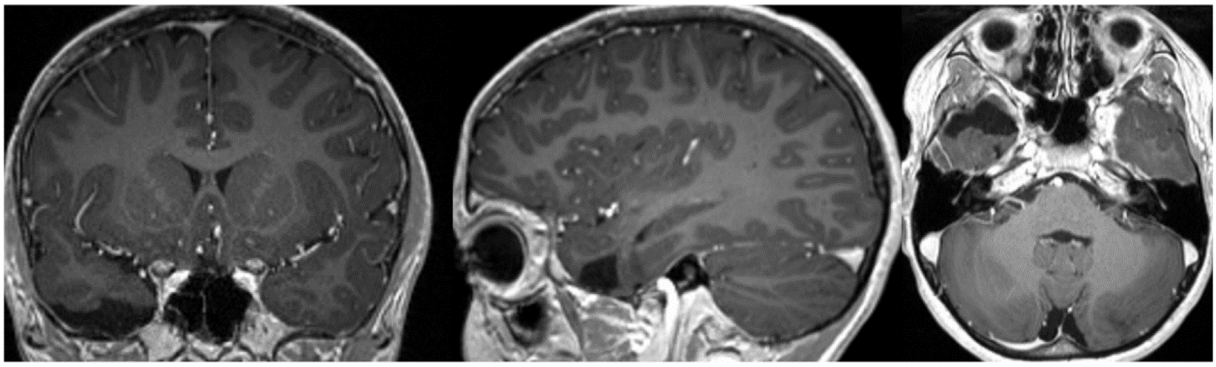

Fig. 3. Brain MRI post-contrast images status post selective resection of the anterior temporal lobe tumor.

two days after MRI with total gross resection of the tumor for lesional epilepsy (Fig. 3). Due to the feasibility of total gross resection, no electrocorticography was needed. Intraoperative pathology reported low-grade glioneuronal tumor with diagnosis being ganglioglioma. No focal cortical dysplasia was noted. Later on, Levetiracetam was weaned due to side effects. At three years follow-up he was seizure free, however he reportedly was experiencing anxiety and was seeing a counsellor.

Discussion

Gelastic seizures are seen in less than 1% of all epilepsies. This is often due to hypothalamic hamartomas (HH) and typically associated with presentation in a pediatric population [2,5]. Due to their location in the hypothalamus, these children may have precocious puberty and impaired cognition [2]. These types of seizures can be detected as early as infancy with a clinical course leading to focal or generalized seizures. Adult presentations have been reported without being associated with hypothalamus hamartomas [3].

Seizure semiology is often determined by the origination of the seizure onset. Laughter is a complex phenomenon that involves different clinical elements. Since laughter in GS is one without joy or emotion, GS are thought to involve a dissociation between the motor and emotional components of laughter [2]. Previous reports suggest that the anterior cingulate region contributes to the motor aspect of laughter, while the processing of joy is due to the basal temporal cortex [2]. There have been multiple case reports of GS with frontal pathology, however there have only been 19 patients previously reported with temporal onset gelastic seizures, and none of them reported seizures secondary to a ganglioglioma [4]. All reported temporal lobe tumors leading to GS were amenable to surgical resection [4]. The only report of a response to medication treatment with vigabatin was a patient with HH [6]. Not all GS have been reported to have laughter without joy. Two reports described patients with joyful laughter where seizures were noted to originate from the temporal lobe [7–8]. It has been reported that frontal onset GS tend to be more emotional free and have a larger motor component [9]. One case report has been noted where an adult patient with gelastic seizures was found to have neurofibrillary tangles on pathology, which are typically associated with gangliogliomas [5]. No report focusing on GS associated with gangliogliomas has been reported.

In our case, the right temporal lobe tumor likely led to temporal origin seizure onset, which then progressed to frontal regions. This is consistent with how laughter is thought to progress in GS. Similar to other reported cases, the patient responded well to surgical intervention and has been seizure free since intervention.

Conclusion

Gelastic seizures are typically associated with hypothalamic hamartomas, however we present a case with new onset gelastic seizure in a patient who was found to have a brain mass located in the anteroventral portion of the right temporal pole with surrounding edema extending to the anterior margin of the fusiform gyrus. Pathology showed low-grade ganglioglioma, which is the first reported case of gelastic seizures due to this tumor type. Patient responded well to surgery without any further seizures at follow-up three years later.

Ethical Statement

Hereby, I Patricia Bacus consciously assure that for the manuscript "Laughter isn't always the best medicine, sometimes it's one of the symptoms" the following is fulfilled:

This material is the authors' own original work, which has not been previously published elsewhere.

The paper is not currently being considered for publication elsewhere.

The paper reflects the authors' own research and analysis in a truthful and complete manner.

The paper properly credits the meaningful contributions of co-authors and co-researchers.

The results are appropriately placed in the context of prior and existing research.

All authors have been personally and actively involved in substantial work leading to the paper and will take public responsibility for its content.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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