



Case Report

Towel induced reflex seizures

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ABSTRACT

Reflex epilepsies are a unique and heterogeneous group of epilepsies characterized by recurrent seizure activity evoked by a specific external sensory stimulus or internal cognitive process. Reflex seizures can be part of other epilepsy syndromes including focal and generalized syndromes and have a growing spectrum of presentations. We report a further subtype of reflex seizures associated with towel exposure.

We give an account of a case of drug-refractory focal epilepsy admitted to the Epilepsy Monitoring Unit for presurgical assessment with 50% of seizures triggered in response to the touch, feel, smell and thoughts around towels. We reviewed the literature regarding the broad phenotype of reflex epilepsies and seizures.

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Introduction

Reflex seizures are termed as such if they are objectively and consistently evoked by a specific external sensory stimulus or internal cognitive process [1]. Epilepsy syndromes which are characterized by repeated reflex seizures are termed reflex epilepsies. Reflex epilepsies are a unique and heterogeneous group – reflex seizure semiology can vary and may involve focal or generalized seizures. Examples of reflex epilepsies previously described in the literature include reading epilepsy, hot-water immersion epilepsy, location-specific epilepsy and idiopathic photosensitive occipital lobe epilepsy [1–3]. Reflex seizures can be part of other epilepsy syndromes including focal and generalized syndromes [2].

In this case report, we detail the case of a 37-year-old woman who was admitted to the Epilepsy Monitoring Unit (EMU) for video-electroencephalogram monitoring. The patient had a history of drug-resistant focal epilepsy; approximately half of this patient's seizures were triggered by the sight, feel or thought of towels. To date, there is no report in the literature of reflex seizures triggered by towels. We describe her history and investigations below.

Case history

A 37-year-old left-handed woman was admitted to the EMU for a presurgical evaluation for longstanding drug-resistant temporal lobe epilepsy. The patient's epilepsy started in childhood, with

the patient experiencing her first seizure at age five. She remembers having just had a bath and being dried by her mother using a towel. It was at this time that her mother noticed her staring into the distance. She did not lose tone and no automatisms were noted. Similar events, consistent with focal seizures with impaired awareness, have persisted since. During the subsequent seizures automatic stereotyped features, including lip smacking and hand fumbling were observed. She described a typical aura of a rising sensation in her stomach, as well as a “lightness” of the limbs. Post-ictally, she was drowsy and confused for up to five minutes. She has experienced these events monthly for her entire life apart from a single 1.5 year long period during which she remained seizure free. She attributes this period of seizure freedom to the addition of lamotrigine. In addition, between the ages of five and ten she had experienced approximately twenty focal to bilateral tonic-clonic seizures.

Her birth was uncomplicated and she accomplished her childhood milestones without significant delays. She completed her education successfully and currently works part-time as well as is raising her family. There was no history of previous central nervous system infections, febrile convulsions or previous head injuries, and no family history of epilepsy was identified. She does not drink alcohol, smoke, or use illicit drugs.

Interestingly, approximately half of her seizures are triggered by towels – the sight of towels, the feel, the touch, the thought, and the smell of towels are all capable of inducing a seizure, either independently of each other or in combination. Towel contact with any anatomical location can potentially trigger a seizure. In particular draping a towel over the patient's shoulders was felt to be most likely to trigger a reflex seizure. Other triggers identified

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include stress, sleep deprivation, as well as a catamenial component with seizures coinciding with the initial days of her menstruation. Due to the role of towel use in triggering her seizures, the patient developed a phobia of towels. While admitted to the EMU, this patient was informed that her clinicians would attempt to provoke a seizure using a towel. She proceeded to text her husband upon hearing this plan. While writing the text message on her phone and thinking of the towel exposure, she experienced a focal seizure with impaired awareness. One interesting aspect of note is that her seizures are not triggered by items similar to towels, for example hospital blankets. In fact, she has adopted blankets as her means of drying herself after bathing.

A 3 Tesla MRI scan was normal (Fig. 1).

The patient underwent video-EEG monitoring for a period of eight days. Three electrographical seizures were recorded. Two were focal seizures with impaired awareness and the patient confirmed that these seizures were her typical events. One of these seizures was precipitated by the patient holding a white towel. The electrographic onset of the seizure occurred 1 min and 5 s after the patient was offered the towel to act as a seizure trigger (Fig. 2). Both seizures were associated with abdominal aura and an intense feeling of fear. Subtle oral and bimanual automatisms were evident. The patient was unable to recall a code word given to her during the seizure. The third seizure was a focal to bilateral tonic-clonic seizure, with focal temporal semiology at onset, as described above. The EEG onset of all the recorded seizures was in the left anterior temporal region (Fig. 3). No other ancillary tests were performed during the admission.

One clinical aura, which consisted of a rising abdominal sensation and intense fear, was observed when the patient was asked to visualize herself holding and using a white towel. There were no EEG changes associated with this event, but the heart rate transiently increased from 78 to 128 beats per minute, which was supportive of a focal aware seizure. We postulate this intrinsic reflex mechanism developed at a later stage for the patient based on her own account that in childhood all seizures were triggered by tactile stimulation-induced seizures. This suggests an evolving epileptogenic network for this patient.

At the conclusion of the admission the patient declined surgical intervention at that time as she felt it would be too disruptive to her life. The patient understood if surgical intervention was to be considered again a further EMU admission would be required including a pre-surgical neuropsychological evaluation contemporaneously. At discharge lamotrigine (previously discontinued in pregnancy) was added to the patient's anti-seizure medications and has resulted in an improvement in seizure frequency.

Discussion

Reflex seizures are epileptic events that are consistently elicited in response to a specific activity or stimulus [4]. Stimuli contributing to reflex seizures are heterogeneous and most commonly occur in response to photic stimulation and hyperventilation. Rare forms of reflex epilepsy have been documented in the literature including location-specific epilepsy [2], reading epilepsy, bathing epilepsy and startle epilepsy [3]. In our case we report an additional rare trigger for reflex seizures in a 37-year-old Caucasian lady.

On review of the literature, we have not identified any reported cases of reflex seizures secondary to use of towels. Nguyen *et al.*, in their case series of X-linked Q555 mutation of the *SYN1* gene report reflex seizures secondary to bathing. This cohort of patients also had an intellectual disability which differs to our patient who was intellectually normal. To date our patient has not undergone genetic or autoimmune testing. In this case series they identified one patient who also develops seizures when showering or rubbing his face with a wet towel [5]. This trigger differs from that described by our patient whose first memory of a seizure was in the context of being wrapped in a towel after bathing as a young child.

The clinical spectrum of reflex epilepsies is heterogeneous and certainly identifying and utilizing this patient's trigger enabled the capturing of several temporal lobe seizures in the EMU to aid with future direction of epilepsy treatment. Interestingly, conceptualizing a towel, with particular attention to color, smell and texture could trigger a seizure in this case. Furthermore, use of a white hospital towel draped around the patient's shoulder and arms was also able to generate a focal seizure in this lady. The patient reported that her inherent "fear of towels" had significantly improved by the time of her discharge, as she inadvertently received exposure therapy as part of the seizure-inducing maneuvers. During the admission the patient was exposed to white bath towels on a daily basis and her immediate fear on seeing a towel diminished over that period of time.

This case diverges from bathing epilepsies in that contact with towels even when doing the laundry could provoke a seizure and it was not limited to towel use following bathing. Our patient had developed strategies to avoid the use of towels in her home and day to day life as she obviously finds the focal seizures disruptive.

Reflex epilepsies are classified as extrinsic reflex epilepsies secondary to an extrinsic stimulus or intrinsic reflex epilepsies secondary to stimuli comprising higher brain function and specific activities carried out by the patient. Intrinsic reflex epilepsies include thinking epilepsy [6]. Our patient appears to fit both

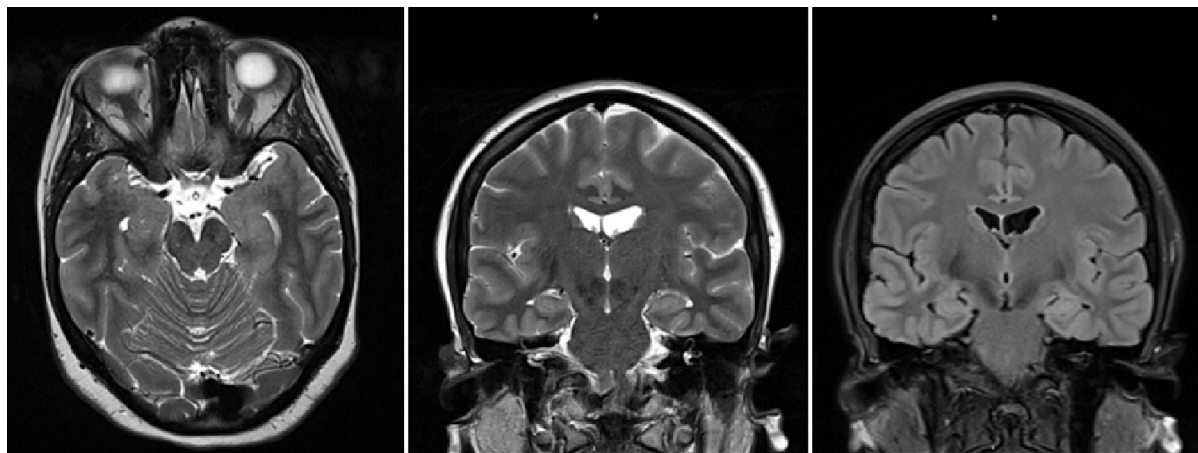


Fig. 1. Axial and coronal T2 and T2 FLAIR sequences with no evidence of mesial temporal sclerosis or focal cortical dysplasia.



Fig. 2. Seizure onset left over right longitudinal bipolar montage.

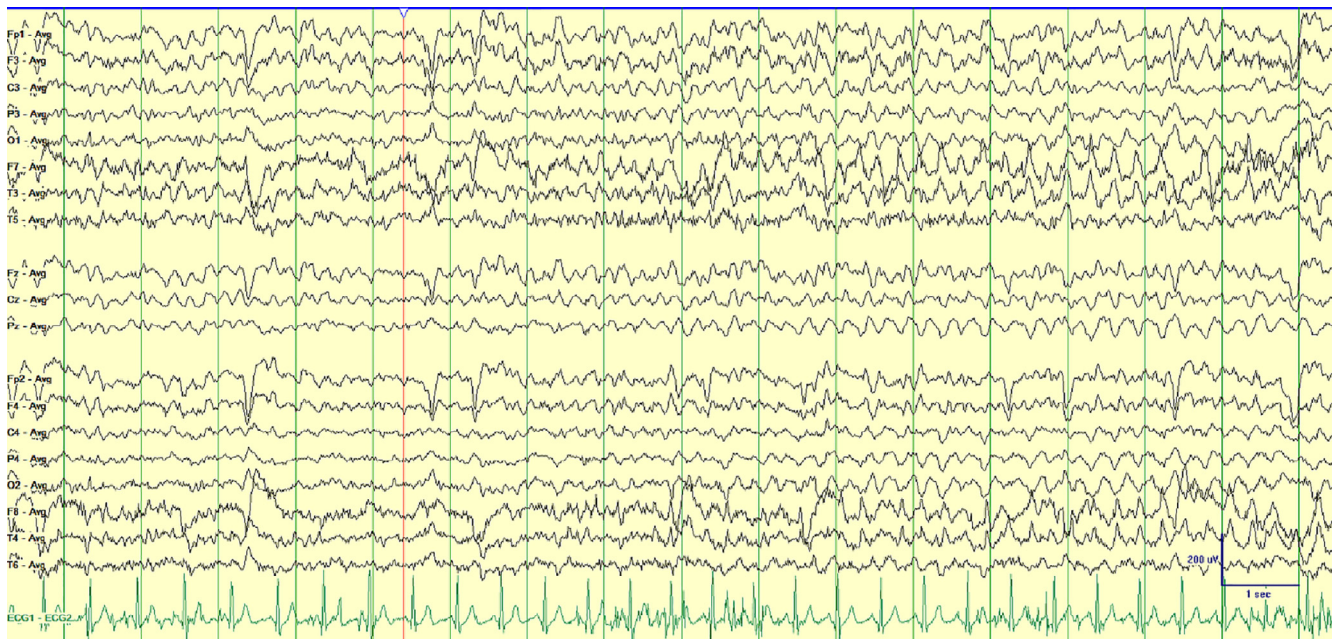


Fig. 3. Seizure onset left over right average reference montage.

categories. We hypothesize that some of this lady’s reflex seizures occur due to intrinsic reflex pathways with a seizure beginning in the limbic cortex of the left temporal lobe due to thinking about towels and the associated emotions. The seizure then propagates throughout the left temporal lobe. However, interestingly our patient most commonly seems to have reflex seizures in the context of holding or touching a towel which best fits with extrinsic reflex seizures.

This is the first report in the literature of reflex seizures occurring secondary to towel use including both extrinsic and intrinsic mechanisms. Of note the patient’s epilepsy while comprising of reflex seizures in 50 % of cases is not a pure reflex epilepsy. While

this is a single case report it has value as it describes a type of reflex seizure not previously reported. We believe this is an important finding to share and emphasizes the expanding world of reflex seizures.

Conclusion

Reflex seizures are a rare type of seizure which may present with a broad and varied phenotype. This case report is the first in the literature reporting towels as a trigger for reflex seizures, thus adding to the literature in terms of potential triggers for reflex seizures and its expanding clinical spectrum.

Ethical statement

The authors have obtained signed informed consent from the patient included in this case report. This information has been anonymized in the paper to the extent that is possible.

Contributions

EJ – first draft writing, editing, concept
WD – first draft writing
EQ – first draft writing
TM – first draft writing, MRI and EEG selection, EEG interpretation
ND – final review, EEG report.

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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