Urinary urge seizure semiology localization by intracranial monitoring

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ABSTRACT

Seizures may present with many different symptom complexes. Seizure semiologies have localization value when contemplating surgical therapies. Epilepsy presenting as a desire to micturate is exceedingly rare, with only a handful of published cases. We present a patient who had initially unexplained childhood urinary urge that progressed into lapses of memory and confusion that was eventually diagnosed as epilepsy in adulthood. Due to refractoriness to medical management, our patient's epileptic focus was localized through both noninvasive and invasive subdural electrode arrays to the nondominant medial temporal lobe and successfully treated with an amygdalohippocampectomy. Only one other case of ictal urinary urgency seizures has been recorded with intracranial electroencephalogram monitoring in the literature.

KEYWORDS Amygdalohippocampectomy; electroencephalogram; epilepsy; intracranial monitoring; lobectomy; localization; micturition; seizures; subdural electrode array; temporal; urge; urinary

Seizures can present with a large variety of symptomatology. Various semiologies have been well documented to correlate with an epileptogenic foci in specific locations of the brain. However, epilepsy presenting as an urge to urinate is one that is quite uncommon. Such rarity leads to a lack of data on localization of its focus.

CASE PRESENTATION

A 38-year-old right-handed woman had a history of intractable epilepsy with spells of urinary urgency, confusion, memory lapse, and rare progression to generalized tonic-clonic episodes. On occasion she also had lip-smacking and a metallic taste in her mouth. Her first seizure began at age 10 years and manifested as the urge to urinate. This occurred once or twice a day. She kept this to herself until she was in her 20s, when she experienced memory lapses and ultimately a generalized tonic-clonic seizure. There were automobile accidents associated with seizures as well.

Numerous medications failed, including lamotrigine, phenytoin, levetiracetam, and pregabalin. Severe side effects were observed with various medications, including Stevens-Johnson syndrome with lamotrigine. There was no improvement in seizure control following vagus nerve stimulator implantation at age 32 years. With a regimen of valproic acid 500 mg twice daily, lacosamide 200 mg twice daily, and zonisamide 300 mg twice daily, seizure frequency improved but she continued to have at

least two to three clusters of memory lapses every few months. There were likely more clusters that she could not recall. Her convulsive episodes were controlled on this combination.

Continuous inpatient scalp electroencephalogram (EEG) monitoring was performed to better localize the epileptic foci responsible for her seizures. During this time, seven spells were captured—three with urinary urgency and consistent with her usual seizures. All spells lateralized to the right. Of the three localizable spells, all started with urinary symptoms, two with onset in the anterior temporal lobe and one in the posterior temporal lobe (*Figure 1*). EEG waveforms during seizures were predominantly rhythmic slowing instead of sharp waves, suggesting a more medial origin rather than neocortical. In addition, some rhythmic slowing was seen in the right temporal-parietal regions corresponding to the patient's sensory symptoms and lip-smacking.

A fludeoxyglucose positron emission tomography scan demonstrated asymmetric hypometabolism in the anterior right temporal lobe, and magnetic resonance imaging (MRI) suggested right mesial temporal sclerosis (*Figure 2*). Wada evaluation localized language dominance to the left brain and memory was codominant but with slight lateralization to the right hemisphere. Neuropsychiatric evaluation revealed no contraindication to surgery.

The patient was admitted and a subdural electrode array was implanted via right frontotemporal craniotomy (*Figure 3*). Anti-epileptic medications were reduced and two of her typical

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Figure 1. Right posterior temporal onset of seizure from T6, P4, O2 electrodes (leads circled).

seizures were captured approximately 48 hours apart, both with onset near the medial two electrodes on the mid-subtemporal strip and second-most medial electrode postsubtemporal strip (*Figure 4* and *Figure 5*).

After discussion with the patient, the decision to proceed with surgery was made. The subdural electrode array was removed and she underwent a microneurosurgical right anterior temporal lobectomy with amygdalohippocampectomy. She tolerated the procedure well with no postoperative deficits noted and was discharged on zonisamide 300 mg daily.

A single seizure was reported at the 6-month postsurgical visit. The Engel Epilepsy Surgery Outcome Scale was Class II. This represents a dramatic improvement compared to several seizures a week prior to surgery.

DISCUSSION

Seizures presenting with the urge to micturate are exceedingly rare. Only seven such case reports have been published so far. A series by Baumgartner et al discussed six of these cases.¹ All of these patients had medically refractory

seizures and, more important, every single case had an epileptic focus seen in the nondominant temporal lobe. Such findings were identified through noninvasive methods such as EEG and MRI.¹ A report by Inthaler et al highlights a 6-year-old boy with partial complex seizure presenting as confusion, oral and genital automatisms, and the urge to urinate, and our patient shared three such symptoms.² EEG showed rhythmic discharge over the left temporal region in that case.²

Figure 2. MRI showing right mesial temporal sclerosis (arrow).

Figure 3. Posteroanterior view x-ray of the skull showing intracranial electrode grid array. Arrow shows medial temporal electrodes.

Figure 4. Intracranial data revealing seizure onset in PST2 with rapid spread to MST1 and MST2 (circled). Note that PST1 (medial most electrode) did not make good contact. Extraneous electrodes have been hidden to allow for more detailed visualization of the active source.

Figure 5. Subdural electrode diagrammatic schema. Note that PST1 (medial-most electrode, circled) was not making good contact. Arrows show spread of epileptiform activity.

Of note, ictal single-photon emission computed tomography (SPECT) used in two cases by Baumgartner et al showed hypoperfusion of the insular cortex.¹ Another study examining 21 patients with postinsular glioma resections noted one patient with residual micturition disturbance, suggesting some role of the insula in such symptoms.³ In our patient, although there was sufficient coverage of the perisylvian region, the insular cortex itself was not directly recorded because we did not feel that the risk of depth electrodes was warranted.

From the limited cases available of this rare condition, a pattern of medical refractoriness and localization to the temporal lobe emerges. In contrast, medically intractable temporal lobe epilepsy due to mesial temporal sclerosis is common and microsurgical corticoamygdalohippampectomy and selective amygdalohippampectomy remain the most

common epilepsy surgeries.⁴ The relatively low rate of complications and high rate of success make surgical treatment in patients with micturition seizures localized to the temporal lobe a reasonable option.

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