

Eating Epilepsy in Oman

A case series and report on the efficacy of temporal lobectomy

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النوبات الصرعية الناتجة عن الأكل في عمان سلسله حالات ومدى فعالية التدخل الجراحي في الفص الصدغي

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الملخص: النوبات الصرعية المثارة بسبب الأكل من الأنواع النادرة من الصرع ولم يتم سابقا الإبلاغ عنها في منطقة الخليج العربي. النوبات الصرعية في هذه النوعية قد تكون جزئية أو عامة. التغيرات في التصوير الدماغى إذا وجدت تكون مقتصره في كثير من الأحيان في الفص الصدغى أو حولها. الخيارات العلاجية الخاصة في هذه الحالات وخاصة في المرضى الذين لا يستجيبون للعلاج الدوائى غير متفق عليها بشكل عام. نحن نقدم سلسله من الحالات المصابة بهذا المرض في عمان الدولة الموجودة في الجزء الشرقى من منطقة الخليج العربى، ونسلط الضوء على المرضى الذين استفادوا من التدخل الجراحي باستئصال الفص الصدغى بعد فشل العلاج الدوائى. التدخل الجراحي يعتبر من الخيارات المهمه لعلاج مرضى الصرع وخاصة الذين لا يستجيبون بالعلاج الدوائى.

مفتاح الكلمات: نوبات الصرع المثارة بالأكل، الصرع المنعكس، استئصال الفص الصدغى، تقرير حالة، عمان

ABSTRACT: Eating epilepsy (EE), where seizures are triggered by eating, is rare and has not been reported in the Gulf region. In EE, the ictal semiology includes partial or generalised seizures. Focal brain changes on imaging, if present, are often confined to the temporal lobe or perisylvian region. Therapeutic options, especially in those patients who are refractory to pharmacotherapy, have not been well-established. We report a series of five patients with EE from Oman, a country located in the eastern part of the Arabian Gulf region, and highlight the usefulness of temporal lobectomy in one patient who had medically-intractable EE. Surgical intervention could be considered as a potential therapeutic option in carefully selected patients with medically-intractable seizures.

Keywords: Eating induced epilepsy; Reflex epilepsy; Temporal lobectomy; Case report; Oman.

REFLEX EPILEPSIES, WHICH INCLUDE eating epilepsy (EE), constitute 2–6% of all epilepsy cases, and are unusual in that seizures are triggered predominantly in response to certain forms of sensory stimuli.¹ EE is rare and has not been reported in the Gulf region. In EE, the ictal semiology mostly consists of simple or complex partial seizures with or without secondary generalisation. While most cases are idiopathic or sporadic, focal structural changes involving the temporal lobe or perisylvian region and, possibly, a genetic predisposition have been reported.² Therapeutic options for medically refractory EE are not well-established. In this case series, we report five EE patients, including a patient with medically refractory EE who was successfully treated by temporal lobectomy.

Case Reports

All 5 patients were examined between 2008 and 2011. The EE diagnosis was clinical and based on patient history and witnesses.

Case 1

A 20-year-old man presented having experienced 10 years of seizures, often beginning during the midday meal, and occurring 2–5 times per month. A few minutes after starting the meal, he would experience palpitation and nausea, followed by a loss of awareness; on some occasions, he had generalised 2–4 minute-long tonic-clonic seizures. His birth, developmental history, and scholastic performance were normal, and no change in mood/



Figure 1: Electroencephalogram (EEG) of Case 1 with eating epilepsy (temporolimbic type). Long-term video EEG showed isolated interictal epileptiform discharges mainly arising from the left mid-temporal region (arrow).

behaviour was reported. A paternal cousin was diagnosed with epilepsy, but his seizures were not triggered by eating. General physical and neurologic examinations were normal.

Conventional electroencephalograms (EEGs) done on 3 occasions were normal. Video-EEG monitoring with the inclusion of meals as an activation procedure failed to demonstrate any ictal abnormalities, though mid-temporal spike discharges were noted inter-ictally [Figure 1]. An initial computed tomography (CT) scan of the brain was normal. He tried a series of anticonvulsant medications with dose escalation, including carbamazepine, sodium valproate, clonazepam,

topiramate, levetiracetam and lamotrigine. His seizures worsened about 6 years after onset to almost daily attacks, sometimes in clusters of 2–3 in a day. A magnetic resonance imaging (MRI) scan of the brain was suspicious of a left medial temporal cortical lesion, possibly glioma or hamartoma. With a diagnosis of refractory complex partial seizures with secondary generalisation triggered by eating, he underwent pre-surgical evaluation at another centre followed by a left temporal lobectomy with amygdalohippocampectomy. Except for transient upper facial paresis due to injury to a facial nerve branch, which improved, he had no post-operative complications. Clobazam was started post-operatively, and seizures and quality of life improved. Over a two-year follow-up period, the seizure frequency decreased to 2–3 attacks of complex partial seizures annually. However, these seizures were not consistently precipitated by eating.

Case 2

A 27-year-old man was admitted for evaluation of epilepsy. He had experienced seizures almost every day for 10 years, with most episodes occurring during or at the end of a midday meal and consisting of jerky movements of the left arm, with occasional stiffness lasting <5 minutes. On several occasions, he fell unconscious, remained motionless for 1–2 minutes, and then woke with a headache. There was no family history of epilepsy. Clinical examination was unremarkable. An EEG revealed inter-ictal

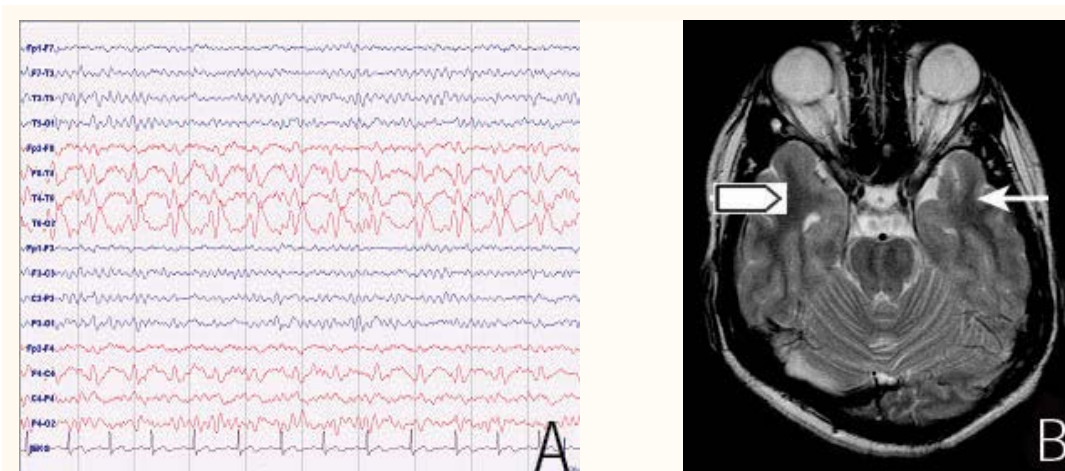


Figure 2: (A) Case 2 with temporolimbic eating epilepsy. The electroencephalogram shows bursts of right fronto-temporal epileptiform discharges. (B) Magnetic resonance imaging brain scan showing right temporal horn dilatation (block arrow) and left anterior temporal atrophy (long arrow).

recurrent right fronto-temporal and generalised spikes and sharp waves [Figure 2a]. Recording during eating, however, was unremarkable. A MRI brain scan revealed left medial temporal atrophy and right temporal horn dilatation [Figure 2b]. He was treated with three anticonvulsant agents—levetiracetam, carbamazepine and phenobarbitone—with partial response.

Case 3

A 21-year-old man presented having had two attacks of generalised tonic-clonic seizures over one year. Both attacks began in the middle of lunch and lasted 2–3 minutes. Clinical examination was unremarkable. No other precipitating factors were evident. A brain CT scan was normal. An EEG showed normal background activity with one prolonged epoch showing fairly rhythmic sharp wave discharges in the right tempo-parietal region. He began carbamazepine and had no recurrence of seizures over 6 months.

Case 4

A 27-year-old woman presented having had recurrent generalised tonic-clonic seizures over the previous 6 years. They lasted a few minutes, with falls, frothing, and sometimes injuries. The nature of the attacks had, however, changed; she began to experience brief episodes of sudden loss of awareness while eating, particularly during lunch. These attacks included sudden irrelevant speech and inappropriate mixing of food on the plate and lasted for about a minute, during which time she was unresponsive. After each episode, she had spontaneous recovery with a post-ictal headache. Clinical examination was unremarkable. A possibility of complex partial seizures triggered by eating, with secondary generalisation was considered; her epilepsy, however, had acquired an eating trigger 6 years after onset. She was started on carbamazepine and her dosage of lamotrigine was increased, resulting in fairly good control of her epilepsy.

Case 5

A 44-year-old man was referred for recurrent

episodes of vacant staring lasting a few minutes at a time, followed by confused behaviour. Over a follow-up period of 3 years, he continued to have similar attacks 1–3 times a month. All his attacks occurred several minutes after he began to eat lunch. Though he reported several attacks while eating fish, this relation was inconsistent. Conventional EEG was normal. A MRI brain scan revealed evidence of left-side mesial temporal sclerosis. He was diagnosed with EE with complex partial seizures. With increased doses of carbamazepine, seizures were controlled with only a single attack occurring over 18 months.

Discussion

Reflex epilepsies have a special pathogenetic connotation: they imply that there is an abnormal association between cortical areas subserving specific sensations, motor, or cognitive activities, and an area which is epileptogenic. A variety of activities such as visual stimuli, bathing, sound, movement, reading, listening to music, and doing arithmetic have been known to trigger epilepsy.^{3–9} While visual stimuli are considered the most common triggers for epilepsy elsewhere, EE and hot-water epilepsy were reported to be the most common reflex epilepsies in Sri Lanka and parts of south India.^{2,8,9,11,13}

The earliest reports of EE date back to 1962,¹⁰ with most reports coming from south Asia.^{2,11–18} EE is found in one to two epilepsy patients per thousand; however, two reports from Sri Lanka noted the prevalence of EE as 5.3% and 14.8% among patients with epilepsy.^{2,11,14} Senanayake *et al.* reported 150 patients with EE detected over a 9-year period in Sri Lanka.¹¹ In this series, most patients were men (3:1); onset was in the second decade of life; 28.3% had a positive family history; seizure type was simple or complex partial, and secondarily generalised seizures were also common. EEGs were abnormal in 71.6% of cases and showed spikes, sharp/slow waves, and focal background changes in the temporal areas. The response to medication in EE was similar to that of non-reflex epilepsies. Clobazam as a monotherapy or adjuvant therapy was found to be useful. Case series from India and Europe also reported similar seizure semiology, EEGs, imaging, and response to treatment.^{11–18} Our EE patients shared most of the features described in

the literature with most having onset in the late first or early second decade. Three had complex partial seizures with or without generalisation, while one each had partial motor and primary generalised seizures. Three of our patients also had additional unprovoked seizures, which were consistent with the findings that unprovoked seizures do occur in EE. EEGs were abnormal in three of our patients, though none of the three who underwent an EEG study while eating had seizures. As reported earlier, EE may not occur with every meal; hence, triggering it during an EEG study may not always be successful. Three of our patients had structural changes in the brain which were limited to the temporal lobes, including a hamartoma, mesial temporal sclerosis, and temporal lobe atrophy. Unlike the reports from Sri Lanka, where anticonvulsant responses were good, three of our four patients had resistant epilepsy with poor response to multiple anticonvulsants. None of our patients had evidence of neuro-metabolic disorders which could explain the seizures.

The exact pathogenesis of EE is unknown. Zefkin *et al.* proposed a pathogenetic mechanism for EE similar to certain other reflex epilepsies.¹⁴ In patients with pattern-sensitive epilepsy, generalised seizures occur when excitation involves a critical mass of the visual cortex, with synchronisation and later spread of excitation from the occipital lobe trigger.¹⁹ Similar phenomena are described in thinking and reading epilepsies. Taste sensation is represented within or near the primary somesthetic area of the tongue in the opercular part of the post-central gyrus. Adjacent areas are also responsive to touch and proprioception from the tongue and mouth, as well as anticipation of taste and smell. The nearby secondary sensory area in the parietal lobe located in the upper bank of the sylvian fissure contains bilateral representations of the face, mouth, and throat. Zifkin *et al.* proposed that a build-up of excitation in and around the primary and secondary sensory areas for taste as well as orofacial sensation on reaching a critical extent manifests clinically either as a simple partial or complex partial seizure, depending on whether primary motor/sensory or temporo-frontal cortices are involved. Early generalisation may possibly manifest clinically as a primary generalised seizure.¹⁴ Sri Lankan studies also suggested a possible genetic influence by virtue of higher familial incidence and overall restriction

to south Asian populations.^{2,12,19} A possible animal model of EE has been developed recently and could assist in elucidating its pathogenesis further.²¹

Remillard *et al.* described two different EE syndromes.²² Those with temporo-limbic onset have seizures precipitated by eating from the onset of epilepsy. Seizures may occur during any phase of a meal, with few spontaneous seizures co-existing. Proposed likely triggers are gustatory, olfactory, autonomic, or emotional-sensory. In contrast, those with extralimbic/suprasylvian onset often have obvious extra-temporal structural lesions with clinical deficits and a long course of epilepsy where seizures later acquire onset in relation to eating. Seizures often occur at the beginning of a meal possibly through proprioceptive sensory input from oral, peri-oral, or masticatory structures.^{14,22} Both varieties of EE may involve recruitment of a critical mass of the cortex by their respective combinations of sensory input in seizure generation.

In light of this description, 4 of our cases had features consistent with temporo-limbic onset. Case 4, who had long-standing epilepsy, with a recent acquisition of an eating trigger, appeared to have extralimbic onset; however, the patient had no evidence of structural brain lesions.

Reflex epilepsy may be refractory to treatment, but options for treatment have not been systematically explored, likely due to the relative infrequency of these cases. Though the reports from south Asia report good response to anticonvulsant medication, 3 of our 5 patients had resistant epilepsy. Modification of stimuli precipitating EE may be beneficial; these may include smaller but more frequent meals, smaller bites, changes in temperature or predominant tastes of foods, or drinking with a straw.²² Surgical intervention for EE has been reported very infrequently, with the description by Remillard *et al.* being the most prominent one. Several of their 18 EE patients who underwent surgery had good outcomes. The nature of surgery varied from amygdalohippocampectomy to excision of the epileptogenic extra-temporal cortex. Intraoperative EEG recordings demonstrated ictal activity in the inferomedial temporal and amygdaloid regions in temporo-limbic EE and in frontocentroparietal regions in extralimbic EE. In the recent past, Cukiert *et al.* reported improvement in EE treated with vagal nerve stimulation (VNS).²³ Among 3 patients with intractable EE, seizures

decreased in frequency by 70–95% and non-reflex seizures by 0–40%; however, no such improvement was observed in hot-water seizures. They suggest VNS is useful in patients with EE not amenable to resective surgery. One of our 5 patients who underwent a left amygdalohippocampectomy experienced dramatic improvement in his EE.

This report has several implications. An attempt to elicit a triggering factor, including eating, should be made in the evaluation of all patients with epilepsy but such stimuli may not always trigger a seizure; hence, a diagnosis of EE should be considered even in the absence of such evidence. A diligent history is the most important factor in its diagnosis. As in other reflex epilepsies, modification of the triggering factors to reduce seizures should be considered in most patients. While most patients with epilepsy have limitations imposed on certain activities, some patients with EE, where all attacks are limited to the act of eating, may not require such limitations. Precautions, however, should be emphasised while eating until seizures are well-controlled (e.g. preventing falls and injuries; avoiding sharp cutlery; mandatory supervision by a relative during eating; avoiding foods that consistently trigger seizures). In patients with seizures in the mid- or latter part of the meal, multiple short eating sessions may prevent recruiting the critical mass of the cortex necessary to trigger a seizure. In patients with EE refractory to medications, surgical intervention may be considered after appropriate pre-surgical evaluation.

Conclusion

We report 5 Omani patients with EE. Similar to reports from south Asia, Oman's EE occurs in young adults, with complex partial seizures being common, and temporolimbic onset seen more frequently. However, 3 of our patients had medically-intractable seizures. Of interest is the dramatic improvement of refractory seizures following temporal lobectomy in one patient. A search for reflex triggers should be made and surgical intervention could be considered a potential therapeutic option in those with EE in appropriate circumstances.

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