

## CASE REPORT

### Focal Seizures as Presenting Symptom of Diabetes: A Case Series

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#### Abstract

*The clinical features of five patients with non-ketotic hyperglycaemia who developed focal seizures are presented. All the five were first time-detected diabetics. Two patients were febrile and had urinary tract infection. Glucose values varied from to 375 to 445 mg/dl. One case had accelerated blood pressure at presentation. All patients had control of seizures with normalization of blood glucose level without any antiepileptic drug. Focal seizures in adults may be first symptom of diabetes mellitus.*

**Keywords:** Focal Seizures, New-Diabetics, Non-Ketotic Hyperglycemia

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#### Introduction

Seizures comprise of 2-3% of admissions in emergency room (ER). Herein, we present a series of cases of focal seizure with moderate hyperosmolality with electroencephalogram (EEG) revealing focal epileptiform discharges precipitated by febrile illness. The correction of hyperglycemia with Insulin and hydration abated the seizures and no antiepileptic was given. These patients also received IV antibiotics (Ceftriaxone for 1 week). After 2 years follow up, patients are seizure free without any antiepileptic.

#### Case Report- 1

A 66 years old female with no significant past history presented to ER with history of abnormal jerky movements of right arm for 12 hours. The attendants noticed one episode of jerky movements of all four limbs with frothing, tongue bite and incontinence. These movements lasted for 4-5 minutes. Attendants also gave history that patient was febrile for 2 days with two episodes of vomiting and diffuse muscleaches. The family confirmed that patient never had seizures in past nor there was any family history of seizure disorder. There was no

history of headache, trauma and exposure to drugs or toxins. The family gave prior history of nocturia and polydipsia for last 2 months but did not seek medical advice. She was never diagnosed with diabetes mellitus before. On examining the patient was febrile (100°F), pulse 98/min and BP 120/70 mmHg. She was confused with terminal neck stiffness and subtle weakness of right side. Both plantars were down. Her non-contrast CT brain was normal. CSF analysis revealed 4 lymphocytes, sugar 147 mg/dl and protein 50 mg/dl. Electroencephalogram revealed focal epileptiform discharges from left frontotemporal area. She was empirically started by emergency care physician on Acyclovir and Phenytoin. Her blood sugars were high 426 mg/dl with a normal anion gap and without ketones in urine. Her routine urine examination revealed 30 pus cells per HPF and she was started on IV antibiotic and Insulin and normal saline. Urine screen was negative for any drugs or toxins. Her HbA1C was 10.2, Calcium was 9.6 mg/dl and Magnesium 2 mg/dl. CBC revealed Hb of 12.3 g/dl, TLC of 7,300 with 82 % neutrophils. LFT, KFT and coagulogram was normal. Contrast MRI brain with diffusion weighted images was normal. After considering all investigations and clinical scenario, it was decided to stop

Acyclovir and Phenytoin and focus on controlling blood sugars; and she was continued on Insulin, normal saline and antibiotics for urinary tract infection. After 48 hours she was conscious, oriented and seizure free with normal neurological examination (her neck stiffness was probably because of dehydration). Her CSF was negative for PCR HSV I and II. Her urine culture grewed *E. Coli* sensitive to cephalosporins. She received IV antibiotics for 5 days. Repeat EEG on 3<sup>rd</sup> day revealed no epileptiform discharges. She was discharged on two doses of Insulin 30/70. She is following us for last 2 years and is seizure free without any antiepileptic drug.

### **Case Report- 2**

A 62 year old woman presented in June 2012 with abnormal posturing of left arm. While walking or standing she used to develop uncontrolled elevation of the left arm with turning of the neck to the left. Each episode lasted few minutes. She was treated as hysterical movement disorder and meanwhile investigated. Her EEG was reported abnormal with focal epileptiform discharges from right hemisphere. Her blood glucose was 445mg/dl without ketonuria; there was no past history of DM. Other investigations were normal including MRI brain. She was treated with Insulin and intravenous fluids. Phenytoin was started but discontinued after 4 days with no recurrence of seizures over 3 years follow up on Insulin, Metformin and controlled diet.

### **Case Report- 3**

A 65 year old obese housewife on diuretics for mild hypertension. One month before admission she had one episode of loss of consciousness for 2 minutes with few abnormal movements of right arm. She consulted some local practitioner who treated her with antihypertensives (ACE inhibitors) and asked for baseline investigation like ECG, Calcium, blood sugar, Creatinine, liver enzymes. Two days after consultation she began to have motor seizures affecting her left arm, with Jacksonian march fits spreading from thumb and fingers up her right arm. She was also febrile and had dysuria and increased frequency of micturation. Her blood glucose was 375 mg/dl on admission.

There was no ketonuria. Urine examination revealed full field pus cells and glucosuria. She was managed with intravenous fluids, antibiotics, and Insulin, but no anticonvulsants. Her urine culture was sterile. After 48 hours the seizures and neurological signs had disappeared. CT showed some cortical atrophy but no focal lesion; the electroencephalogram was normal. She discharged on Insulin and had suffered no further seizures for past two years.

### **Case Report- 4**

A 53 year old man was admitted with complains of four attacks of jerky movements of the right arm with no loss of consciousness. Examination showed only distal weakness with hyperreflexia of the right arm. His blood glucose concentration was 398 mg/dl on admission and there was no ketonuria. Over the next four days in hospital he had 5 to 6 focal motor seizures of the right side lasting up to 30 minutes, which failed to respond to increasing doses of Phenytoin, Levetiracetam, and Diazepam; meanwhile little attention was paid to his moderate hyperglycaemia. His MRI brain was normal. Serum Calcium, Sodium and Magnesium levels were normal. EEG showed left focal epileptiform discharges. Eventually Insulin dose was hiked when the blood glucose value reached 180-200 mg/dl, the seizures disappeared. Repeat electroencephalogram was normal; over the next six months he had no further fits and had taken no anticonvulsants.

### **Case Report- 5**

A 61 year old obese man with hypertension was admitted in 2012 with repeated left-sided partial motor seizures affecting her face and upper and lower limbs. There was a tonic phase lasting few seconds followed by clonic jerking lasting about half minute. Residual flaccid weakness of the left arm was noted. Initial blood glucose was 412 mg/dl and there was no ketonuria. He had no history of diabetes mellitus. Blood pressure was 210/100 mm Hg. A right hemisphere lesion was suspected. But his MRI brain was normal. His serum Calcium, Sodium and Magnesium was normal. Electroencephalogram was normal. The seizures were difficult to control initially despite treatment with Diazepam, Levetiracetam and Phenytoin but stopped when blood glucose

was controlled (less than 180 mg/dl). He was discharged on Metformin, Phenytoin and Insulin. He remained free of seizures for 6 weeks after discharge. Phenytoin was stopped after 6 weeks and patient is seizure free for past 3 years.

## Discussion

Most published reports on diabetic hyperglycemia are concerned with hyperosmolar coma [1]. In practice diabetes show a spectrum of hyperglycemia and are often detected before they develop severe hyperosmolality. Our patients had moderate hyperglycemia and had focal abnormalities on EEG.

Focal epilepsy has been reported as first manifestation of diabetes [2,3,4]. Seizures are frequent and repetitive and often leave a transient postictal paralysis [5]. Focal epilepsy is due to combination of hyperglycemia, hyponatremia and hyperosmolality [2]. As long as these biochemical disturbances remain uncorrected the seizures persist. They do not respond to anticonvulsants but disappear with Insulin and rehydration and patient remains seizure free till blood sugars are controlled. Other neurological manifestation in non-ketotic hyperglycemia includes focal neurological impairment (usually post-ictal), myoclonic twitches, nystagmus or meningeal signs [6].

The association is difficult to explain. Focal seizures are classically symptomatic of structural lesions within the brain; and it is usually proposed that small, clinically undetectable areas of critical ischemia are present in these patients brain which are apt to become seizure foci in response to further insults. Generalised seizures are more usually provoked by metabolic disturbances. Since elderly patients with diabetic ketoacidosis or hypoparathyroidism [7] are equally likely to have Cerebrovascular disease, but don't present with focal fits?

Theories based on cellular dehydration due to the hyperosmolality achieved in absence of ketosis have been explored in detail [8] and experimental studies adduced to show that hypertonic solutions will activate existing seizure foci [9]. Absence of focal seizures in diabetic ketosis is believed to be due to anticonvulsant effect of ketosis [10]. Ketogenic diet has benefit in epileptic patients particularly

with partial seizures. Focal seizures in diabetes are treated by controlling diabetes; neurological symptoms and signs will then be reversed. Anticonvulsant are ineffective and Phenytoin may even be harmful, since it may aggravate hyperglycemia [11,12].

## Conclusion

Focal seizures may be the first symptom of diabetes. These seizures are refractory to treatment with antiepileptic drugs but respond well to treatment of underlying diabetes and abate once hyperglycemia is treated. Thus, diabetes should be ruled out in patients with focal seizures.

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