

Paroxysmal choreoathetosis as presenting symptom of diabetes mellitus

Sir: Paroxysmal choreoathetosis due to disorders of glucose metabolism has been sparsely described in the literature.¹⁻⁴ We describe a patient, who experienced paroxysmal choreoathetosis in the course of developing diabetes mellitus.

An 80 year old female was admitted to our hospital because of a generalised tonic-clonic seizure. She had never been seriously ill before. At the age of 33 partial thyroidectomy was performed, and thyroid function tests remained normal without medication. At the age of 76 a benign tumour of the rectum was removed. For some years she took digoxin 0.1 mg daily because of "a weak heart" and loperamide 2 mg bd because of persistent diarrhoea. Ten days prior to admission she noted periods of involuntary movements of both arms, occurring 2 to 3 hours after meals, and lasting approximately 20 minutes. Three days before admission, she showed intense thirst and apathy.

On admission she was unconscious and had generalised seizures. Her temperature was 39°C. Physical examination showed no further abnormalities. Seizures stopped after 5 mg diazepam were injected intravenously. Hb, ESR, leucocyte count, electrolytes, thyroid and liver function tests were normal. Serum sodium level was 134 mmol/l, estimated osmolality 327 mmol/kg, urea 10.0 mmol/l, and creatinine 233 µmol/l. Serum glucose level was 39.9 mmol/l, pH 7.34, PCO₂ 3.2 kPa, PO₂ 12.4 kPa, and bicarbonate concentration 13 mmol/l. Glucosuria was found, and ketones were absent. Chest radiographs and body fluid cultures were normal. CT of the brain revealed no abnormalities; on lumbar puncture clear colourless CSF was obtained, with a glucose of 15.7 mmol/l, 4 mononuclear cells, protein of 0.38 g/l and no bacterial growth on culture.

She was treated with 0.9% saline with potassium chloride intravenously and soluble insulin by pump. Serum glucose decreased to 15.0 mmol/l within 5 hours. Renal insufficiency, probably caused by high temperature and osmotic diuresis, normalised. After approximately 7 hours the patient was alert. Neurological examination now revealed a slight confusion and a mild left sided hemiparesis, interpreted as being postictal. Temperature had returned to normal. The next day the hemiparesis had disappeared but now the patient displayed severe choreoathetotic movements of arms and legs, severe torticollis, buccolingual dyskinesia, and blepharospasm. She was fully alert

and did not show anxiety, diaphoresis, hunger, palpitations, or other adrenergic warning symptoms. Serum glucose at that time was 4.4 mmol/l (glucose-oxidase method). Her relatives recognised the movements of the extremities as similar to those she had had before admission.

The involuntary movements persisted for 2 days, fluctuating in severity, disappearing at serum glucose levels of 8.0 mmol/l or higher, and reappearing at levels under 5.0 mmol/l. An EEG showed bilateral slow wave activity, more pronounced in the left frontal leads. CT on the fifth day again showed no abnormalities. She was treated with glibenclamide 5 mg tid and metformine 500 mg tid, and her serum glucose levels now remained between 5.0 and 10.0 mmol/l. She was discharged after 15 days, without neurological signs.

Two explanations can be postulated for the paroxysmal choreoathetosis our patient experienced prior to admission. Hypoglycaemia can cause choreoathetosis,^{3,4} and this possibility is supported by the hyperosmolar coma the patient developed some days later. On the other hand, hypoglycaemia can also lead to choreoathetosis,^{1,2} and in our patient a role for postprandial (reactive) hypoglycaemia, a well-known phenomenon in the evolution of the non-diabetic to the diabetic state,⁵ was suggested by the occurrence of symptoms 2 to 3 hours after the meals.

After treatment of the coma, our patient did not display hypoglycaemia in a strict sense (serum glucose levels below 3.5 mmol/l). However, there seemed to be a relation between the waxing and waning of the involuntary movements and low glucose levels. Moreover, slow wave activity on the EEG supported our hypothesis that serum substrate concentrations were inadequate for normal brain function.

An issue as yet undetermined is, whether neurological signs are elicited at the moment the serum glucose concentration declines below a predetermined value or, alternatively, when a certain rate of decline is reached. The concept of a fixed lower limit which must be passed is supported by recent experimental work.⁶ The value of this limit, however, changes over time. In rats it has been demonstrated that the maximal velocity of glucose transport (and thus the velocity at any given serum concentration) across the blood-brain barrier is increased after a few days of hyperglycaemia,⁷ and decreased after a few days of hypoglycaemia.⁸ This phenomenon has not yet been demonstrated to be operative in human beings, but "relative hypoglycaemia" caused by this mechanism

could be an explanation for the choreoathetosis experienced by our patient.

There are many possible causes of choreoathetosis.⁹ Most of them were excluded in our patient. Nevertheless, a side effect of loperamide (which, has never been described before), or of digoxin (which has been described⁹) cannot be ruled out. However, a repeated chance occurrence of the clinical signs with the glucose nadirs is highly unlikely. It can be argued that, for choreoathetosis to occur as a manifestation of neuroglycopenia, preexisting decreased functional or metabolic capacity of the basal ganglia must exist. Whether this diminished capacity is caused by the prolonged use of loperamide or digoxin, by the process which causes senile chorea, or by, for example, a "forme fruste" of Sydenham's chorea, remains speculative.

J HAAN

HPH KREMER

GWAM PADBERG

Department of Neurology,

University Hospital,

PO Box 9600,

2300 RC Leiden, The Netherlands

Reference

- Newman RP, Kinkel WR. Paroxysmal choreoathetosis due to hypoglycemia. *Arch Neurol* 1984;41:341-2.
- Parajua JL, Gallo J, Goni M, Locutura J. Coreoathetosis paroxística en el curso de coma hipoglucémico. *Med Clin (Barcelona)* 1986; 87:521.
- Rector WG, Herlong HF, Moses H. Nonketotic hyperglycemia appearing as choreoathetosis or ballism. *Arch Int Med* 1982;142:154-5.
- Totoritis M, Cornish D, Thompson F. Nonketotic hyperglycemia. *Arch Int Med* 1982; 142:1405.
- Permutt MA. Postprandial hypoglycemia. *Diabetes* 1976;25:719-33.
- Amiel SA, Simonson DC, Tamborlane WV, DeFronzo RA, Sherwin R. Rate of glucose fall does not affect counterregulatory hormone responses to hypoglycemia in normal and diabetic humans. *Diabetes* 1987;36: 518-22.
- Gjedde A, Crone C. Blood-brain glucose transfer: repression in chronic hyperglycemia. *Science* 1981;214:456-57.
- McCall AL, Fixman LB, Fleming N, Tornheim K, Chick W, Ruderman NB. Chronic hypoglycemia increases brain glucose transport. *Am J Physiol* 1986;25:442-7.
- Padberg GWAM, Bruyn GW. Choreia—differential diagnosis. In: Vinken PJ, Bruyn GW, Klawans HL eds. *Handbook of Clinical Neurology* Amsterdam, 1986;5(49):549-64.