

Anorexia, seizures, and ST-T abnormalities in a morbidly obese 21-year-old man with the Down syndrome

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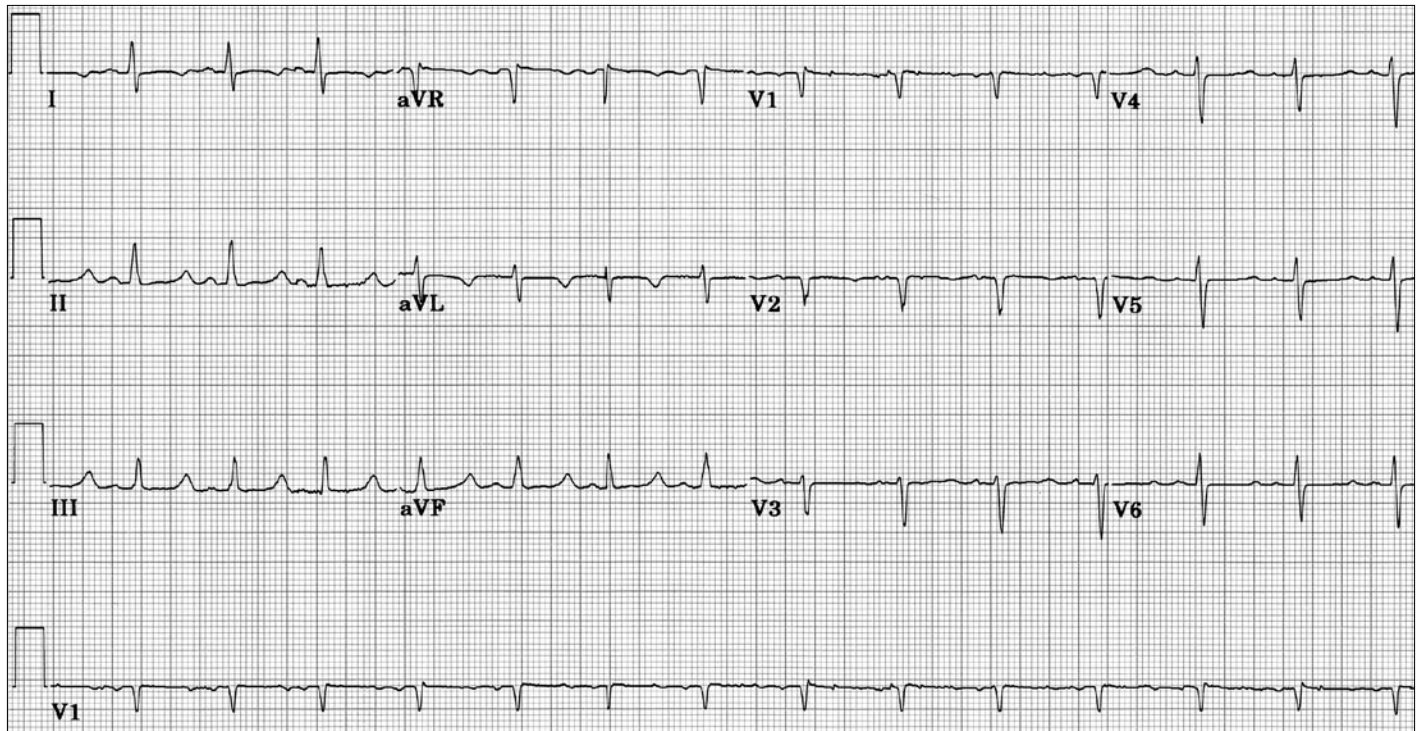


Figure. Electrocardiogram recorded in the emergency department. See text for explication.

A morbidly obese 21-year-old man presented to the emergency department complaining of lack of appetite for 2 to 3 weeks, and his sister told of the patient's having brief episodes of loss of consciousness accompanied by jerking movements. An electrocardiogram was recorded (Figure).

The electrocardiogram shows sinus rhythm, delayed precordial R-wave progression, inverted T waves in lead I, and low to flat T waves in all of the precordial leads. The most striking abnormality is the markedly prolonged QT interval (QT = 480 msec; corrected QT = 577 msec). Of the many causes of QT prolongation (Table), most lengthen the T wave. This patient's long QT interval is due entirely to an increase in the ST segment, which is typical of hypocalcemia and, with the exception of congenital long QT syndrome 3 (3) and possibly hypothermia (4), is not seen in other conditions. The patient's total serum calcium concentration was strikingly low (3.6 mg/dL; normal = 8.7–10.7).

Normally about 47% of serum calcium is protein bound, and about 53% is free (10% complexed and 43% ionized) (5). Because protein-bound serum calcium is bound primarily to albumin and

because a low serum albumin occurs in many ill patients, hypoalbuminemia is a common cause of a decrease in this bound fraction. In such patients, the ionized calcium is essentially unaffected, and consequently the low total serum calcium has no effect. This patient's serum albumin (3.4 g/dL) was barely below the normal range (3.5–5.0) and was responsible for only a small fraction of the decrease in his total serum calcium.

Of the causes of a decrease in ionized serum calcium, the most common is severe kidney disease. This patient had untreated end-stage renal disease with a serum creatinine of 16.5 mg/dL, a blood urea nitrogen of 138 mg/dL, a serum phosphorus of 9.6 mg/dL, a hematocrit of 14.6%, and a hemoglobin of 4.7 g/dL with normal red blood cell indices. His low serum albumin was due to

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Table. Some causes of a long QT interval*

Myocardial ischemia or infarction
Congenital long QT syndrome
Class IA and III antiarrhythmic drugs
Noncardiac drugs (psychotropic, antibiotic, antimicrobial, et al)
Neurogenic QT prolongation
Marked bradycardia
After resuscitation from cardiac arrest
Hypothermia
Hypothyroidism
Hypocalcemia

*From references 1 and 2.

proteinuria, which in the past had measured over 5 g per 24 hours. Although his current serum potassium was elevated (6.7 mg/dL), the minimally peaked T waves in electrocardiographic leads II, III, and aVF were not sufficiently tall to diagnose hyperkalemia from the tracing.

Aside from lengthening the ST segment and consequently the QT interval, hypocalcemia's only adverse cardiac effect is the rare occurrence of congestive heart failure. A decrease in ionized serum calcium does increase neuromuscular excitability, however, and the patient's seizures presumably were related to that. He had a large pericardial effusion but no signs of tamponade. He was admitted, received calcium intravenously, was started on hemodialysis, and was transfused with blood.

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