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CARDIOVASCULAR FLASHLIGHT

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Panoramic change of transient hyperkalemia on electrocardiogram

Yehyun Park, Sanghoon Shin, and Hye Jin Hwang*

Cardiology Division, Yonsei Cardiovascular Center and Cardiovascular Research Institute, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul, South Korea 120-752

* Corresponding author. Tel: +82 2 2228 8460, Fax: +82 2 2227 7943, Email: hyejin@yuhs.ac

A 52-year-old woman diagnosed with abdominal actinomycosis by exploratory laparotomy was inadvertently injected intravenous Penicillin G potassium 10 million units for 10–15 min period under arterial blood pressure and electrogram (ECG) monitoring on the first postoperative day. Immediately after the injection, the patient suddenly turned pale and then unconscious. The electrocardiogram presented the panoramic view of hyperkalemia. The QRS complex was rapidly widening (*) and sequentially merged with the T wave (°) (Panels A and B). Simultaneously, the blood pressure was declining. Sine wave, a hallmark of hyperkalemia, evolved into ventricular flutter-like pattern (Panel C). After cardiac resuscitation and IV injection of calcium chloride, the widened QRS complex (*) recovered gradually (°) (Panel D) with elevation of arterial blood pressure. Consequently, normal sinus rhythm with narrow QRS was fully restored 15 min after IV injection of calcium chloride 1200 mg. A sudden rise of potassium level from 3.8 to 6.6 mmol/L was identified by blood sample obtained during cardiac resuscitation. An immediate sequential change of the P-QRS-T morphology following injection of the potassium containing drug Penicillin G potassium and a restoration of sinus rhythm by calcium chloride suggested the arrhythmia was caused by a sudden elevation of circulating potassium in the blood.

The electrocardiographic manifestation of hyperkalemia is characterized by peaked T waves, prolongation of the PR interval, widening of the QRS complex, and consequent sine wave. This serial electrocardiogram showed panoramic views of transient, abrupt hyperkalemia from peaked T wave to sine wave within 30 min.

