Severe ST Depression Due to Hypokalemia Mimicking Ischaemia

A 16 year old boy, a case of paraplegia due to tubercular myelitis 6 months back had undergone laparoscopic cholecystectomy 3 months ago. He developed biliary leak with peritonitis and septicaemia for which he was treated with antibiotics and Amphotericin and drainage and later discharged. He was readmitted with fever, loose motions with poor intake. He was in septic shock with decreased urine output on admission. His systolic BP was 70 mm Hg with heart rate 70-80/min with bounding peripheral pulses. CVP was 0-2 mmHg with s. creatinine of 2.1 mg% and S.K was 2.9 meq/L and Sr. bicarb 21meq/l with no urine output since 6 hours of admission. He was resuscitated with IV fluids to bring up the CVP “ 6-8 mm Hg without success. At this time the monitor showed a change in ECG pattern. A 12-lead ECG done showed generalized ST depression [Fig. 1] mimicking severe generalized ischemia. He was cautiously given 20 meq of K+ over 1 hr. During this period echocardiography revealed normal size cardiac chambers with EF of 50-55%, and no regional wall motion abnormality. At the end of K+ supplement his ST depression reverted to normal [Fig. 2] and Sr. K+ was 3.4 meq/l, but BP was still in the range of 70-80 mm Hg systolic and hence vasopressor (Noradrenaline) infusion was started. Patient responded to treatment and gradually improved.

Although ECG is fairly good indicator of hyperkalemia, it is not reliable for detecting hypokalemia. On ECG, the QRS complex begins to widen when serum potassium drops to about 3 meq/L, ST segment may became depressed and the T-wave may begin to flatten. The U wave also begins to increase in size, becoming as tall as the T wave. The U wave reaches ‘giant’ size and fuses with the T wave when the level drops to 1meq/l. The pattern of prominent U waves combined with depressed ST segments and flattened T wave is known as ‘Roller-Coaster Effect’.

In our patient, there was marked ST depression with J-point depression also favouring ischemia as the cause. But since patient was young with normal 2D-Echo, response to potassium supplement confirms that the ECG changes were secondary to severe hypokalemia.

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