

Effect of Serum Electrolytes on a QTc Interval and Mortality in Patients admitted to Coronary Care Unit

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Abstract : Background: Serum electrolyte abnormalities are a common cause of an acquired prolonged QT syndrome, especially, in the coronary care unit (CCU) setting. Optimal electrolyte ranges among the CCU patients have not been sufficiently investigated. Methods: We identified 8,498 consecutive CCU patients who were admitted to the CCU at Mayo Clinic, Rochester, the USA, from 2004 through 2013. Association between first serum electrolytes and baseline corrected QT intervals (QTc), as well as in-hospital mortality, was tested using multivariate linear regression and logistic regression, respectively. Serum potassium 4.0- < 4.5 mEq/L, ionized calcium (iCa) 4.6-4.8 mg/dL, and magnesium 2.0- < 2.2 mg/dL were used as the reference levels. Results: There was a modest level-dependent relationship between hypokalemia (< 4.0 mEq/L), hypocalcemia (< 4.4 mg/dL), and a prolonged QTc interval; serum magnesium did not affect the QTc interval. Association between the serum electrolytes and in-hospital mortality included a U-shaped relationship for serum potassium (adjusted odds ratio (OR) 1.53 and OR 1.91 for serum potassium 4.5- < 5.0 and \geq 5.0 mEq/L, respectively) and an inverted J-shaped relationship for iCa (adjusted OR 2.79 and OR 2.03 for calcium < 4.4 and 4.4- < 4.6 mg/dL, respectively). For serum magnesium, the mortality was greater only among patients with levels \geq 2.4 mg/dL (adjusted OR 1.40), compared to the reference level. Findings were similar in sensitivity analyses examining the association between mean serum electrolytes and mean QTc intervals, as well as in-hospital mortality. Conclusions: Serum potassium 4.0- < 4.5 mEq/L, iCa \geq 4.6 mg/dL, and magnesium < 2.4 mg/dL had a neutral effect on QTc intervals and were associated with the lowest in-hospital mortality among the CCU patients.

Keywords : calcium, electrocardiography, long-QT syndrome, magnesium, mortality, potassium

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