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Hyperkalemia Does Not Predict Outcome From Digoxin Excess in Patients With Renal Dysfunction

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Background: The 1973 *Clinical Toxicology* study "Hyperkalemia in Acute Digitalis Poisoning: Prognostic Significance and Therapeutic Implications" is often quoted to emphasize the importance of assessing hyperkalemia in patients presenting with digoxin toxicity. Bismuth *et al* reported a 50% mortality rate for patients with potassium between 5 - 5.5 mEq/L and 100% mortality for those with potassium > 5.5 mEq/L. However, this study included a number of young patients (age ranged from 15 - 94 years) with acute digitalis ingestions (10 of 91 "overdosage occurred in the course of therapy") and normal renal function. This differs from the elderly patient on chronic digoxin therapy now more commonly seen. An assessment of digoxin toxic patients seen by medical toxicologists in hospitals throughout the country over a 13 month period (as reported to the ACMT ToxIC registry) indicates that 71% of the 42 digoxin patients were over the age of 65 years.

Methods: We performed a single center IRB-approved retrospective chart review of all hospitalized patients with an elevated digoxin serum concentration (>1.2 ng/mL) and evaluated the correlation between plasma potassium, digoxin concentration and mortality.

Results: We identified 70 patients (74% women) in a 2 year period with complete data. The mean age was 81 years (SD 9; range 58-96 years). The mean plasma creatinine was 1.8 mg/dL (SD 0.8) and the calculated GFR (Glomerular Filtration Rate) ranged from 9-81 ml/min. The mean plasma potassium was 4.7 mEq/L (SD 1.1) with a range of 2.6-8.1 mEq/L. The digoxin concentration averaged 2.7 ng/mL (SD 1) and did not correlate with either the potassium or calculated GFR. There were 8 patients who died during their hospital stay. The mortality rates for patients with presenting potassium <5 mEq/L, between 5.0 - 5.5 mEq/L, and >5.5 mEq/L were 9%, 0%, and 31% respectively. Chart review identified digoxin toxicity as a likely primary and proximate cause of death in only 1 patient who presented in VFib arrest with a potassium of 6.5 mEq/L. Six of the remaining seven deaths occurred in the setting of palliative care and were attributable to underlying chronic disease states. Seventeen patients were treated with digoxin Fab fragments; 6 of these patients had potassium > 5 mEq/L.

Conclusions: Hyperkalemia is not a reliable predictor of digoxin toxicity in elderly patients with multiple co-morbidities, nor is it predictive of mortality or the need for therapy with digoxin Fab fragments.