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Do sick children with severe acute malnutrition in Kenya die of arrhythmia?

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Background. Annually 2.1 million children die as a consequence of severe acute malnutrition (SAM). Fatal arrhythmias due to electrolyte perturbations and fluid shifts during refeeding have been postulated as a possible cause, although the data supporting this is limited. We investigated the role of arrhythmias among children with SAM in Kenya.

Methods. As part of the CArdiac Physiology in MALnutrition (CAPMAL) Study, children with SAM (marasmus or kwashiorkor) were matched by age and gender with equally sick non-malnourished controls. All presented to a rural Kenyan hospital between March and November 2011. Serial 12-lead ECGs and electrolytes at days 0, 7 and 28, and also 7 day continuous Holter monitoring were recorded.

Results. 88 SAM cases and 22 controls were well matched for age, gender and clinical presentation, with similar baseline characteristics apart from anthropometry (weight for height z-score -3.2 in cases vs -1.1 in controls) and HIV status (22.7% vs 0.0%) (p all <0.05).

Mean heart rate was lower among SAM cases than controls at admission (132 vs. 142/min; p=0.0412), this difference disappeared by day 7. Corrected QT interval (QTc) was short (<2nd centile for age) in 27.3% cases and 4.6% controls (p=0.023). This difference persistent until day 7 but was not associated with death (OR 0.52 p=0.426). Holter data showed 31 episodes of ventricular tachycardia (VT) in 7 cases and 1 control and 13 episodes of bradycardia in 3 cases. Fifteen episodes of VT (48.4%) occurred in a child who died 9 days after admission with disseminated tuberculosis, 2 occurred in a patient who died of sepsis. All bradycardias and other VTs remained asymptomatic and were not associated with poor outcome. A difference in median potassium levels at admission (3.2 vs 4.2 mmol/L; p=0.0018) and median magnesium levels at day 7 (0.91 vs. 0.97 mmol/L, p=0.0029) in SAM cases vs controls was observed. No difference in electrolyte levels at any other stage was apparent and these were not affected by the presence of HIV.

Conclusions. We found many episodes of VT in children with SAM, but these did not appear to lead to unexpected death during the re-feeding period.