

SELECTIVE MEASUREMENT OF IONIZED CALCIUM LEVELS IN TRAUMA: EARLY ICAL IS ASSOCIATED WITH WORSE OUTCOMES

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Introduction

Recent data suggests that hypocalcemia plays a key role in the outcomes of trauma patients. Ionized calcium (iCal) is believed to be the most physiologically relevant blood calcium measure. However, in current practice, providers select on which patients to draw iCal levels, and, to date, there have been no published prospective studies on iCal in trauma. We hypothesized that the occurrence of early (<4hr) iCal measurement will reflect injury severity and predict outcomes.

Methods

We interrogated a prospectively maintained trauma data repository from a single urban Level 1 Trauma Center. Trauma patients >15 years old were included. We assumed normal distributions and used unpaired t-tests to compare group means.

Results

There were 1431 patients included, of which only 76 (5%) had iCals measured within the first 4hr. These 76 patients were, on average, hypocalcemic (mean iCal 1.09, SD 0.15). Proportion of patients with penetrating injury was higher in those having iCals drawn in 4hr (36% vs 7%), and mean ISS as well as shock index were higher for those with early iCal measurement (23 vs 9 and 0.98 vs 0.66, respectively; $P<0.0001$). Of those with early iCal measurement, 66% (50/76) received blood, but only 10% of those (5/50) had iCal drawn before blood. Finally, patients with iCal measured in the first 4hr spent more time in the ICU and hospital (mean ICU- and hospital-free days 13 vs 23 and 18 vs 26, respectively; $P<0.0001$) and had higher overall mortality (16% vs 2%). Considering only patients with either ISS>15 or shock index >1.0, this effect of an early iCal measure remains, and considering patients with both ISS>15 and shock index >1.0, early iCal was still associated with less time in the hospital (mean hospital-free days 7 vs 13, $P<0.05$) and higher mortality (4/18 [22%] vs 1/20 [5%]).

Conclusions

This study demonstrates that a select group of trauma patients get iCals drawn early in their course, and the mere event of this lab measure predicts a longer time in the ICU and hospital as well as higher mortality. These findings suggest that there is something influencing trauma providers to draw an iCal, and, while injury severity and shock appear to contribute to that decision-making, there is additional information tipping off clinical gestalt that is related to how well these patients will do. While this analysis implores a prospective design for studying hypocalcemia in trauma, it yields valuable clinical and prognostic information based on a single early laboratory measurement in trauma patients.