

Early hypocalcemia in pediatric major trauma: a retrospective cohort study

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Background:

- Early hypocalcemia (EH) is common in adult major trauma patients and has been associated with coagulopathy, shock, increased transfusion requirements, and mortality.
- The incidence of EH in pediatric severe trauma has not been investigated.
- We aimed to explore the incidence of EH among severely injured children.

Methods:

- A retrospective cohort study at a tertiary children's hospital and a level 1 pediatric trauma center.
- We extracted the medical records of all pediatric major trauma patients, defined as an age less than 18 years and an Injury Severity Score (ISS) greater than 15, admitted after trauma team activation from January 2010 to December 2020.
- The primary outcome was the presence of EH: Patients were classified into 3 groups: severe EH (ionized calcium [iCa] <1 mmol/L), EH (1 < iCa < 1.16 mmol/L), and normal calcium (iCa ≥1.16 mmol/L).

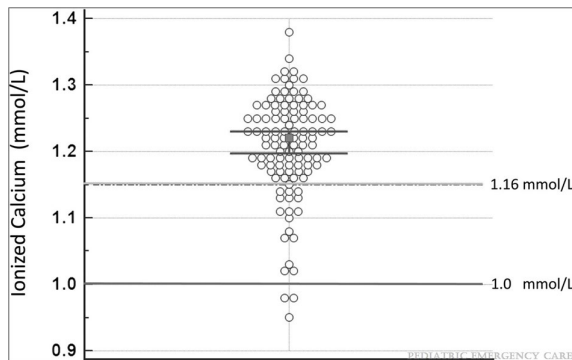
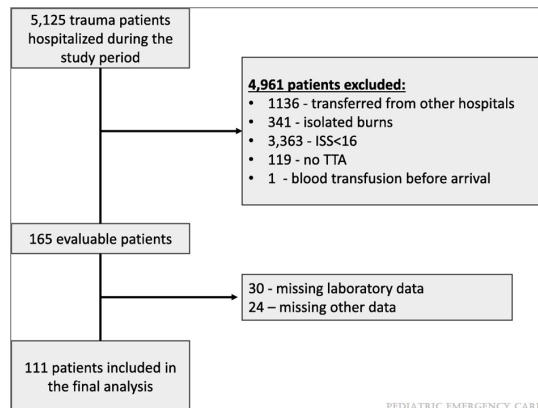


TABLE 2 - Comparison of Hypocalcemic and Normocalcemic Patients			
	Hypocalcemia (iCa < 1.16 mmol/L, n = 22)	Normal Ca ⁺⁺ Level (iCa ≥ 1.16 mmol/L, n = 89)	P
Patient characteristics			
Sex, male	18 (81.8%)	69 (77.5)	0.88
Age, y	9.5 (4–15)	11 (4–15)	0.9
Blunt trauma	21 (95.5)	85 (95.5)	0.57
Glasgow Coma Score	11 (3–15)	13 (7–15)	0.24
ISS	25.5 (17–29)	21 (17–26)	0.39
Laboratory parameters			
Ionized Ca ⁺⁺ , mmol/L	1.11 (1.03–1.14)	1.23 (1.19–1.27)	<0.001
pH	7.34 (7.26–7.4)	7.3 (7.27–7.34)	0.09
Lactate, mg/dL	22.9 (14–31)	23 (14.73–32)	0.67
Bicarbonate, mEq/L	22.9 (20.2–23.6)	23.1 (21.28–24.83)	0.34
Hemoglobin, g/dL	12.2 (10.48–13.15)	12.5 (11.45–13.8)	0.25
Platelets, 10 ³ /μL	280 (230–370)	338 (273–406)	0.08
WBC, Ku/L	16 (10.99–19.12)	15.6 (11.11–21.36)	0.69
PT, s	14.7 (12.7–16)	12.8 (12.1–13.8)	0.06
PTT, s	28.3 (26.7–31)	28.6 (26.33–30.98)	0.88
Creatinine, mg/dL	0.49 (0.38–0.7)	0.54 (0.38–0.72)	0.9
Hospital course			
PICU LOS, d	3 (2–4)	2 (1–5)	0.43
Hospital LOS, d	8 (4–16)	6 (3–13)	0.36
Blood product transfusion during first 48 h	6 (27.3)	18 (20.2)	0.67
In-hospital mortality	2 (9.1)	1 (1.1)	0.18

Data are presented as n (%) or median (IQR).
PICU indicates pediatric intensive care unit; PT, prothrombin time; PTT, partial thromboplastin time; WBC, white blood cells.

Results:

- 111 children met the inclusion criteria. The median age was 11 years (IQR, 4–15), and 78.4% (87) were male. The median ISS was 21 (IQR, 17–27).
- Hypocalcemia was found in 19.8% (22) and severe hypocalcemia in 2.7% (3) of the patients.
- Although not statistically significant, hypocalcemic patients had higher ISS (25.5 [IQR, 17–29] vs 21 [IQR, 17–26], P = 0.39), lower GCS (11 [IQR, 3–15] vs 13 [IQR, 7–15], P = 0.24), a longer hospital stay (8 days [IQR, 2–16] vs 6 days [IQR, 3–13], P = 0.36), a more frequent need for blood products (27.3% vs 20.2%, P = 0.74), and higher mortality rates (9.1% vs 1.1%, P = 0.18) compared with normocalcemic patients.

Conclusion:

Our data suggest that in the setting of major trauma, EH is less frequent in children than previously reported in adults. Our preliminary data suggest that pediatric patients with EH may be at risk of increased morbidity and mortality compared with children with normal admission iCa.

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