

Biochemical hypercalcaemia following the use of antibiotic-loaded calcium sulphate in hip and knee surgery

A LARGE SINGLE-CENTRE OBSERVATIONAL STUDY

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CLINICAL QUESTIONS Is biochemical hypercalcaemia after antibiotic-loaded calcium sulphate common? When it occurs, does it matter clinically?

666

Hip and Knee procedures
identified

468

with postoperative serum
calcium recorded (70%)

44

postoperative Ca >2.6 mmol/L
(9.4% of measured cases)

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required medical management
(hypercalcaemia)

BACKGROUND & METHODS

WHY INVESTIGATE THIS?

Antibiotic-loaded calcium sulphate is widely used for local antimicrobial delivery in hip and knee surgery. The concern is not whether a biochemical change can occur, but whether that change is clinically important.

WHAT IS KNOWN

- Commonly used**
Antibiotic-loaded calcium sulphate is widely used in hip and knee surgery for local antimicrobial delivery (1)
- Recognised signal**
Post-operative hypercalcaemia has been previously reported in studies examining complication profiles (2, 3)
- Evidence gap**
Existing evidence is heterogeneous, with few large clinical series. We sought to characterise postoperative hypercalcaemia in a large, consecutive single-centre cohort.

STUDY AIM

To report the incidence, timing and biochemical significance of postoperative hypercalcaemia and explore its relationship with calcium sulphate volume from a single tertiary centre in the UK.

HOW WE STUDIED IT

- Design** Retrospective observational study of consecutive hip and knee procedures.
- Setting** Single tertiary orthopaedic centre; 2015–2022.
- Data** Demographics, comorbidity, calcium sulphate volume and all recorded postoperative serum calcium measurements.
- Definition** Biochemical hypercalcaemia: serum calcium >2.6 mmol/L.
- Dose groups** ≤10 cc · 20 cc · ≥30 cc.
- Analysis** Descriptive statistics; chi-squared and Fisher’s exact tests for dose-group proportions.

RESULTS

STUDY COHORT

666

procedures

→

468

post-op serum
calcium recorded

→

44

Ca >2.6 mmol/L
(9.4%)

Only 1 of 44 patients required medical management of hypercalcaemia (hydration).

CORE BIOCHEMICAL FINDINGS

2.24

median peak postoperative
serum calcium (mmol/L)

IQR 1.16 mmol/L*

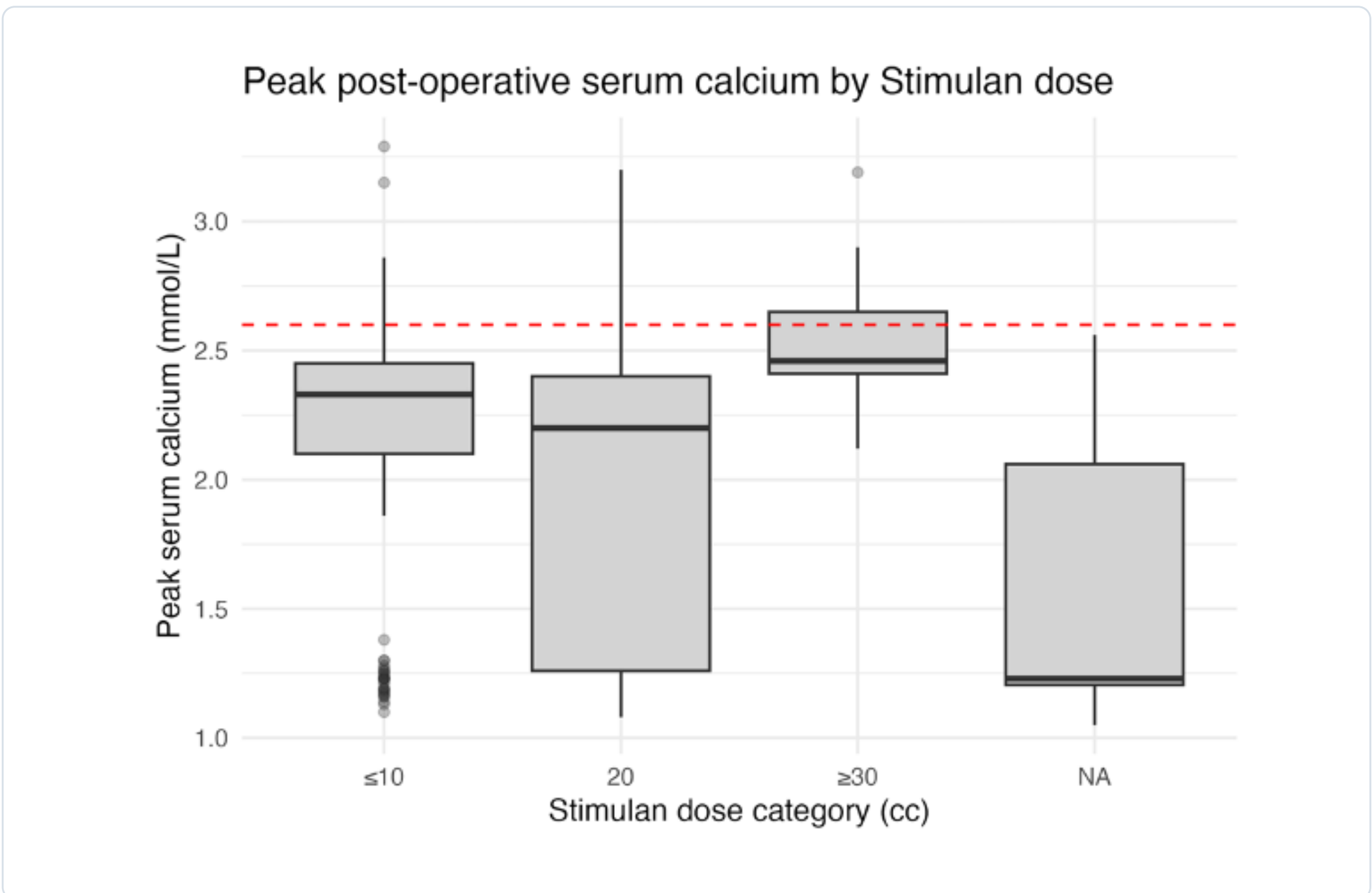
2.4 d

median time to peak
calcium

IQR 0.28 days

DOSE-RELATED PATTERN

Hypercalcaemia was observed across all dose categories and was more frequent at higher calcium sulphate volumes*



OBSERVED HYPERCALCAEMIA BY DOSE

Stimulan volume	Proportion
≤10 cc	8.7%
20 cc	12.7%
≥30 cc	44.4%

$\chi^2 = 9.96$, $p = 0.007$ · Fisher's exact test $p = 0.015$

CLINICAL IMPACT

1 / 44

required medical management

Hydration was sufficient; the remainder did not require medical treatment.

*MEASUREMENT CAVEAT

Calcium surveillance was not standardised.

This limits how confidently the dataset can define the timing of peak calcium or confirm resolution in every case.

Interpret as a safety signal

CLINICAL INTERPRETATION

The signal is real. The clinical burden is low.

Biochemical hypercalcaemia occurred in a minority of cases. Higher calcium sulphate volumes were associated with a greater observed proportion, but clinically significant hypercalcaemia requiring intervention was rare.

INTERPRETATION

WHAT STANDS OUT

- 1. A measurable biochemical signal**
44/468 (9.4%) of patients with postoperative calcium measurements had Ca >2.6 mmol/L.
- 2. A dose-related pattern**
The highest observed proportion occurred in the ≥30 cc group, although this subgroup was small.
- 3. Clinical consequences were limited**
Only one patient required treatment for hypercalcaemia in the original cohort.

A CAUTIOUS READING OF DOSE

≤10 cc	8.7%
20 cc	12.7%
≥30 cc	44.4%

The dose association is an observed pattern - not evidence of a specific toxicity threshold.

CONCLUSION

Biochemical hypercalcaemia was observed in a minority of procedures using antibiotic-loaded calcium sulphate.

Hypercalcaemia was more frequently observed in cases with higher calcium sulphate volumes. However, the majority of cases were not clinically consequential and only one patient required medical management.

LIMITATIONS

- Retrospective single-centre design.
- Postoperative calcium available in 70% of procedures.
- Calcium surveillance was not standardised, limiting interpretation of timing
- Stimulan volume was not recorded in every procedure.
- Initial analysis did not confirm resolution with a repeat calcium measurement in every case.

KEY TAKE-HOME

A biochemical signal with limited clinical toxicity.

Hypercalcaemia was observed, but clinically significant cases requiring intervention were uncommon and the clinical course was reassuring.

References:
1. Abosala A, Ali M. *J Bone Jt Infect.* 2020;5:43–49.
2. Kallala R, et al. *Bone Joint Res.* 2018;7:570–79.
3. Sigmund IK, et al. *Acta Orthop.* 2024;95:707–14.