

Renal safety of intraoperative local vancomycin powder application in orthopedic surgery: a retrospective analysis

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Intrawound vancomycin powder was **not associated with short-term renal impairment.**

Serum creatinine and eGFR remained stable at both postoperative time points — irrespective of dose, application plane, indication, and co-medication.

2 / 50

AKI incidence (4 %)
all KDIGO stage 1

0

stage 2–3 AKI events
across all 50 patients

p > 0.05

all prespecified
subgroup comparisons

01 · BACKGROUND

Intrawound vancomycin powder is widely used in orthopedic surgery to prevent surgical site infections — very high local antibiotic concentrations at low systemic exposure. Its **efficacy is well documented; its renal safety is not.**

- VA-AKI in 5–43 % of patients under systemic vancomycin
- low serum levels after topical use — but uptake is not zero
- nephrotoxic co-medication is frequent in orthopedic patients
- renal outcomes after intrawound use are rarely assessed

AIM

To quantify short-term changes in serum creatinine and eGFR after intraoperative local vancomycin application.

02 · METHODS

Design & cohort. Retrospective single-centre study, Department of Orthopedic and Trauma Surgery, Martin Luther University Halle-Wittenberg (Jan – Jul 2024). 50 adults — spinal, arthroplasty and (septic) revision surgery — with topical vancomycin powder applied epi- or subfascially; data from electronic medical records.

Endpoints. Primary — AKI per KDIGO serum creatinine criteria. Secondary — within-patient changes in SCr and eGFR vs. baseline.

PRESPECIFIED SUBGROUPS

co-medication

application plane

dose < / ≥ 1000 mg

aseptic / septic

Statistics. Wilcoxon signed-rank; Fisher’s exact; two-sided p < 0.05; IBM SPSS v27.

03 · RESULTS

Across all 50 patients, renal parameters remained stable: **no systematic rise in serum creatinine, no central eGFR shift** at either time point — AKI was confined to two patients (KDIGO stage 1), both under nephrotoxic co-medication.

50

patients included

64.2 ± 20.5

mean age, y (16–93) · 58 % male

62 / 38 %

aseptic / septic indication

1000 mg

median dose (500–4000)

2 / 50

AKI — all KDIGO stage 1

0

AKI stage 2–3 events

Fig. 1 · Primary endpoint — acute kidney injury (KDIGO)

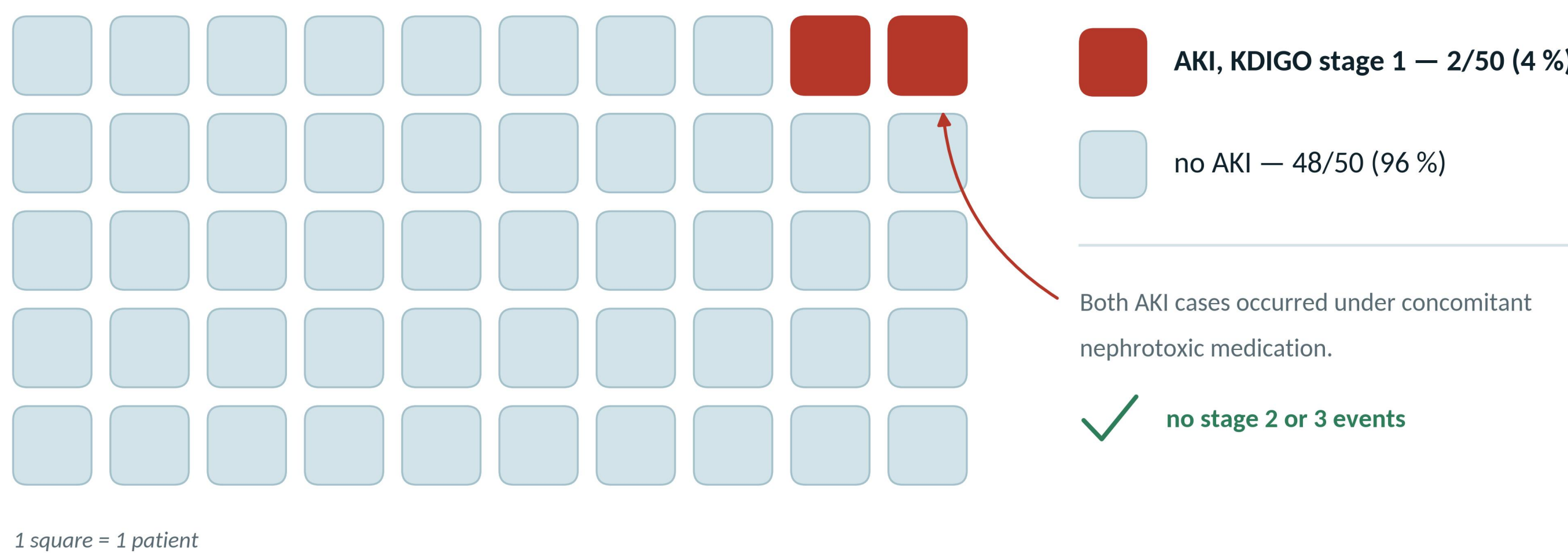
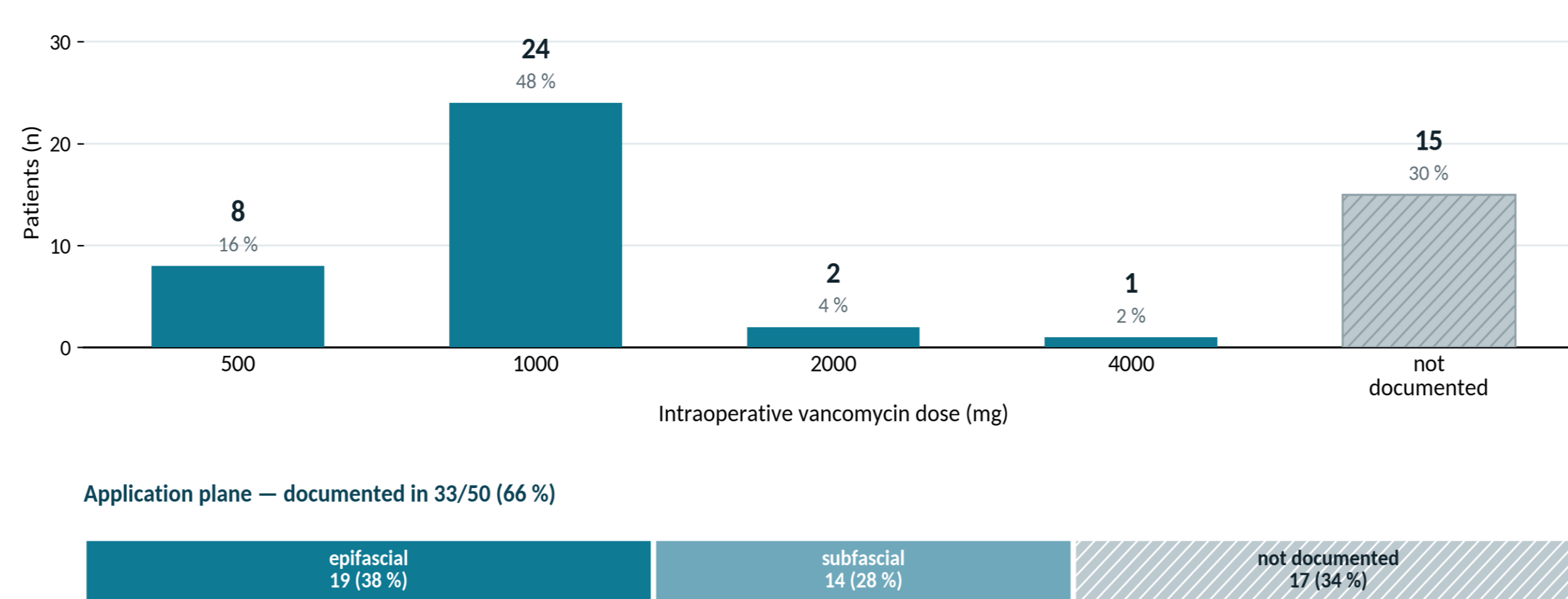


Fig. 2 · Vancomycin dose & application plane



Subgroup analysis — AKI incidence
Fisher’s exact · no differences

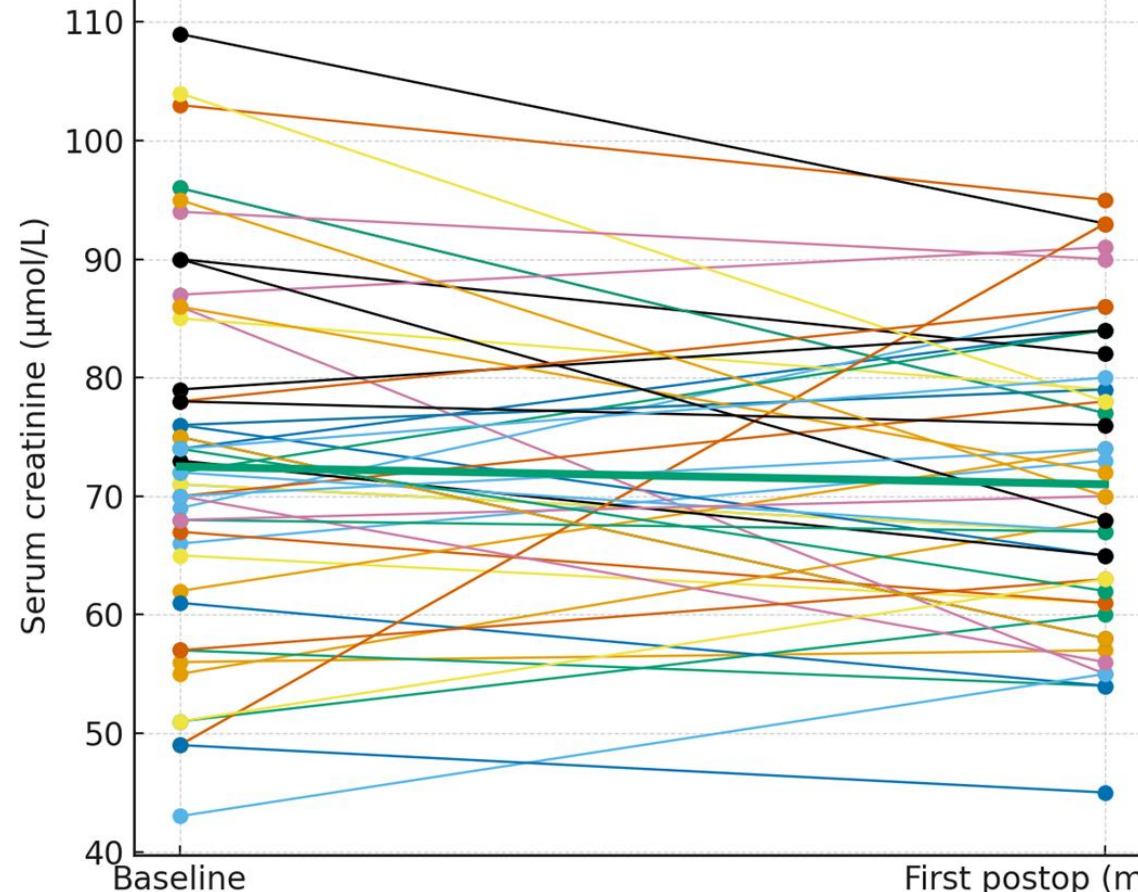
nephrotoxic co-medication
yes vs. no — p > 0.05

application plane
epi- vs. subfascial — p > 0.05

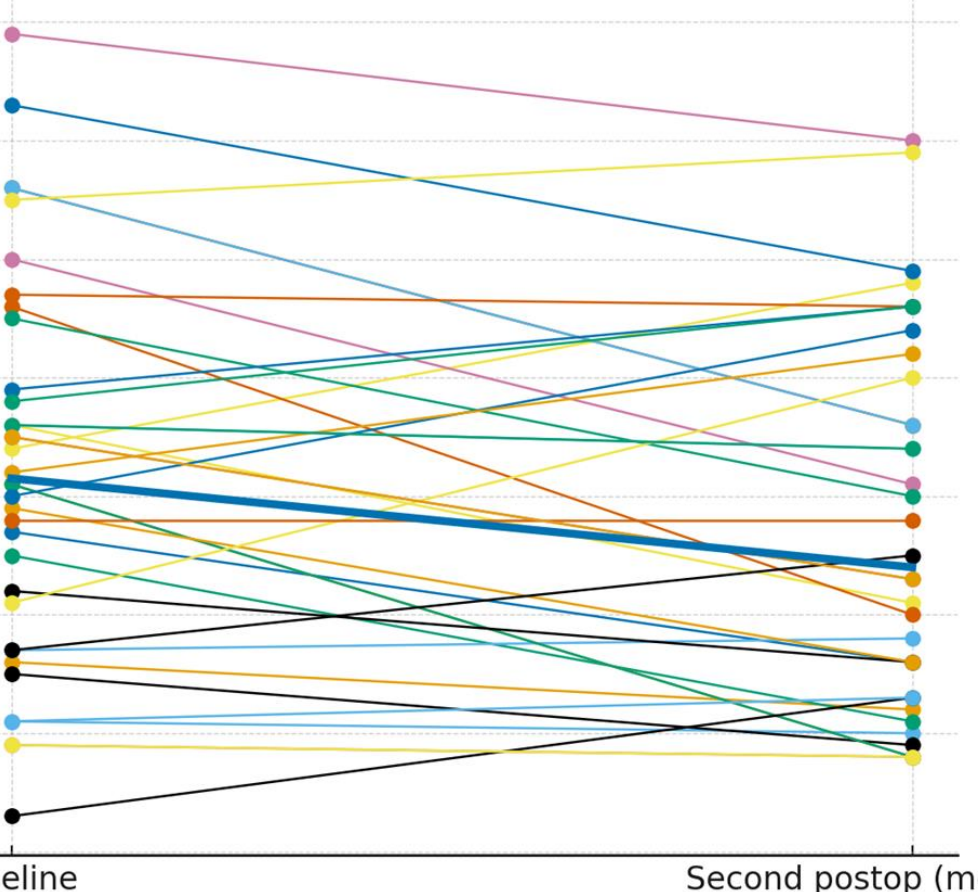
vancomycin dose
< 1000 vs. ≥ 1000 mg — p > 0.05

surgical indication
aseptic vs. septic — p > 0.05

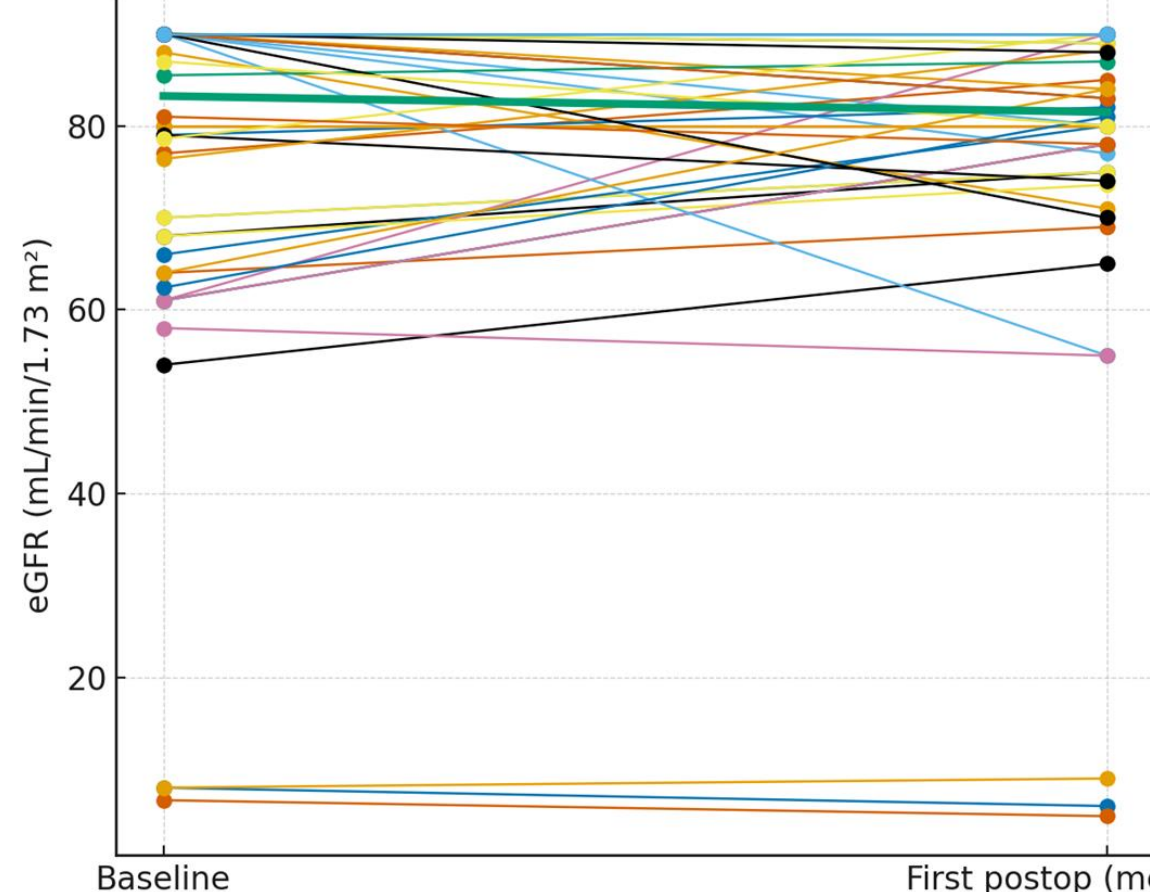
Serum creatinine · baseline → POD 1



Serum creatinine · baseline → POD 3



eGFR · baseline → POD 1



eGFR · baseline → POD 3

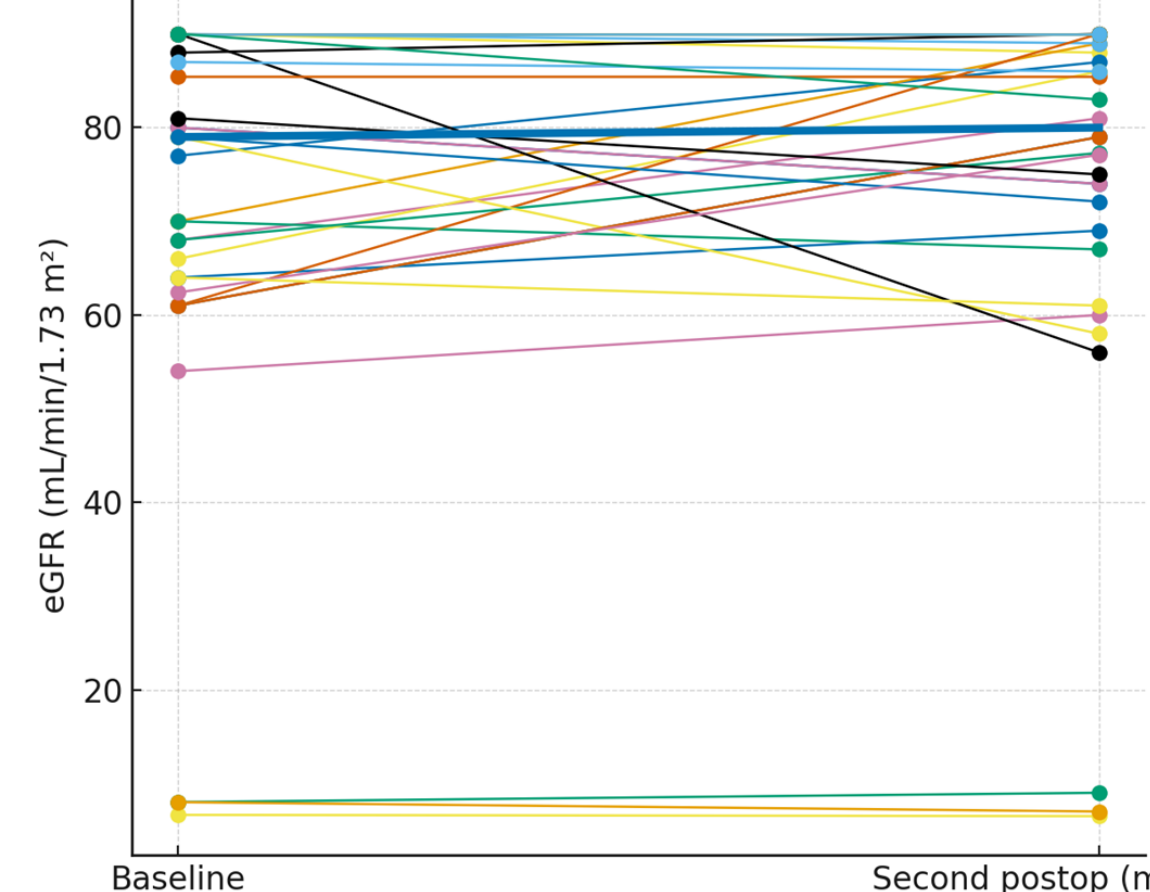


Fig. 3 · Paired patient-level renal trajectories (original publication figures). Thin lines: individual patients · thick line: cohort median · first postoperative value at a median of 1 day, second at a median of 3 days.

04 · DISCUSSION & CONCLUSION

Renal trajectories remained stable irrespective of dosage (including ≥ 1000 mg), subfascial application, septic indication and nephrotoxic co-medication. Both AKI events occurred under concomitant nephrotoxic exposure — consistent with transient creatinine rises attributable to co-medication rather than an independent effect of topical vancomycin. Locally applied vancomycin largely bypasses systemic exposure while achieving very high concentrations at the surgical site — a pharmacokinetic profile that plausibly explains the low nephrotoxicity signal.

Limitations: retrospective single-centre design · n = 50 · early observation window · no serum vancomycin levels · no vancomycin-free control group.

Take-home messages

- Local intrawound vancomycin powder was **not associated with short-term renal impairment.**
- AKI was rare (2/50, stage 1 only) and occurred **only with nephrotoxic co-medication.**
- No safety signal across **dose, plane or indication.**
- Prospective trials with **standardized dosing and PK monitoring** remain warranted.

SELECTED REFERENCES & ETHICS

- Beschauner J, Felsberg M, Zeh A, Delank K-S, Gutteck N, Werneburg F. Renal safety of intraoperative local vancomycin powder application in orthopedic surgery: a retrospective analysis. J Bone Joint Infect 2025;10:609–615.
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- Ethics: declaration of no objection, Ethics Committee, Medical Faculty, MLU Halle-Wittenberg. The authors declare no competing interests.



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