VANCO Trial—Preliminary Results on the Safety Profile of Intrawound Vancomycin Powder in Complex Spine Surgery

Ralph T. Schär[1] and Stefan Zimmerli[2]

In spine surgery, surgical site infections (SSIs) are feared complications, especially in instrumented spinal fusion cases with SSI rates ranging up to 13%.[1] Surgical patients with SSIs often require revision surgery, are burdened by prolonged hospitalization, and ultimately cause significant increases in disease-specific costs.[2] SSIs following spine surgery have been associated with higher morbidity and mortality, especially in patients with more complex comorbidities and in the elderly.[3] Thus prevention of SSI in general is of utmost importance, and much effort has been invested to mitigate SSI rates.[4] Among many proposed perioperative measures, intrawound vancomycin powder has repeatedly shown promising results in the literature.[5] Therefore intrawound vancomycin powder has been administered to the wound bed by many spine surgeons around the world for many years. This preventive measure is easily performed, and vancomycin powder is inexpensive and readily available in most hospitals. However, current evidence supporting this practice is based mainly on retrospective case series and systematic reviews hereof (evidence Class III). As a result, the routine use of prophylactic intrawound vancomycin powder in spine surgery is often criticized. In an effort to provide better evidence for this simple intervention, we have initiated a prospective clinical trial in 2019 (VANCO Trial, ClinicalTrials.gov Identifier: NCT04017468).

The potentially toxic adverse effects of systemic vancomycin, such as nephrotoxicity and ototoxicity, are well recognized. Until recently, no data were available from prospective studies on the safety profile and the systemic uptake of intrawound vancomycin powder administered to the subcutaneous, suprafascial plane. The suprafascial as opposed to the more widely performed subfascial administration of vancomycin powder for prevention of SSI in spinal fusion surgery has been previously described.[6] In our recently published substudy and safety report of the first 34 patients enrolled in the ongoing VANCO Trial, we demonstrated that systemic uptake of vancomycin from the wound was negligible and that suprafascial administration of vancomycin powder is safe.[7] These preliminary results showed no quantifiable vancomycin serum levels in any of the 17 patients randomized to the treatment arm on postoperative days 1 and 2. In addition, we found no evidence for vancomycin-induced nephrotoxicity or ototoxicity. With regard to other adverse events, there was no statistically significant difference between the treatment and control groups.

The incidence of systemic adverse events from the use of intrawound vancomycin powder has been reported to be as low as 0.3% in a systematic review of mainly retrospective studies.[8] In this review of 6701 patients, only 2 cases of transient hearing loss and 1 case of nephropathy were recorded. In addition, the causality between these adverse events and the topical administration of vancomycin powder is debatable. This is in line with our preliminary findings of undetectable serum vancomycin levels. Accordingly, concerns about systemic toxicity of topically administered vancomycin powder are not justified. Nevertheless, there is an ongoing debate on the efficacy and safety of intrawound vancomycin powder. With regard to local adverse events, wound seroma formation and possibly somewhat prolonged serous discharge from the wound have been attributed to intrawound vancomycin powder.[6] These local adverse events might represent allergic or inflammatory reactions.[7]

In accordance with many existing studies, our preliminary data confirm the safety of intrawound vancomycin powder in complex spine surgery as a preventive measure against SSI. Nonetheless, the efficacy of intrawound vancomycin powder in spine surgery needs to be demonstrated in well-designed prospective trials. Furthermore, the impact of vancomycin powder on local wound healing, as discussed earlier, and on the pathogen profile in SSIs needs to be better understood. Hopefully, the VANCO Trial will eventually contribute to answering these questions. For now, careful patient selection remains paramount, and intrawound vancomycin powder for SSI prevention should be reserved for high-risk cases, such as open instrumented spinal fusions or complex revision surgeries.

REFERENCES

1. Texakalidis P, Lu VM, Yolcu Y, et al. Impact of powdered vancomycin on preventing surgical site infections in neurosurgery: a systematic review and meta-analysis. *Neurosurgery*. 2019;84:569-580.
2. Featherall J, Miller JA, Bennett EE, et al. Implementation of an infection prevention bundle to reduce surgical site infections and cost following spine surgery. *JAMA Surg*. 2016;151:988-990.
3. Casper DS, Zmistowski B, Hollern DA, et al. The effect of postoperative spinal infections on patient mortality. *Spine*. 2018;43:223-227.
4. Spina NT, Aleem IS, Nassr A, Lawrence BD. Surgical site infections in spine surgery: preoperative prevention strategies to minimize risk. *Global Spine J*. 2018;8(suppl 4):31S-36S.
5. Shan S, Tu L, Gu W, Aikenmu K, Zhao J. A meta-analysis of the local application of vancomycin powder to prevent surgical site infection after spinal surgeries. *J Int Med Res*. 2020;48:300060520920057.
6. Haimoto S, Schär RT, Nishimura Y, Hara M, Wakabayashi T, Ginsberg HJ. Reduction in surgical site infection with suprafascial intrawound application of vancomycin powder in instrumented posterior spinal fusion: a retrospective case-control study. *J Neurosurg Spine*. 2018;29:193-198.
7. Schär RT, Jesse CM, Montalbetti M, et al. Negligible systemic uptake of suprafascial vancomycin

powder following instrumented posterior spinal fusion-preliminary results from a randomized clinical trial (VANCO trial). *Neurosurgery*. 2021;89:967-972.

8. Ghobrial GM, Cadotte DW, Williams K Jr, Fehlings MG, Harrop JS. Complications from the use of intrawound vancomycin in lumbar spinal surgery: a systematic review. *Neurosurg Focus*. 2015;39:E11.

From the Departments of [1]Neurosurgery and [2]Infectious Diseases, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

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