

Prophylaxis of Orthopedic Implant-related Infections with Locally Applied Vancomycin using a Hydrogel as Matrix

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Currently, no options are available for local delivery of antibiotics to uncemented orthopedic implants for prophylaxis of infection. The present study investigates the efficacy of a vancomycin-loaded hydrogel (Novagenit – Italy) as coating for prevention of early postoperative infections.

For this purpose, 18 New Zealand White rabbits received a titanium rod in the proximal tibia after local contamination with *S. aureus*. In the experimental group, a vancomycin-loaded hydrogel was coated on the rods (N=6). Two control groups were used: no-hydrogel (N=6) and hydrogel-only (N=6). Blood parameters (erythrocyte sedimentation rates (ESR) and neutrophil counts) and weights were measured during the experimental period of 28 days. Following explantation, the anterior tibia was processed for detection of viable bacteria. The posterior part containing the rod was used for histological purposes: bone-implant contact, grading severity of infection, and fluorochrome deposition to follow bone formation.

The blood values and weights remained stable over time in the ‘vancomycin-hydrogel’ group,

suggesting the absence of infection in the animals. In contrast, the hydrogel-only group showed decreased weights during the study and increased ESR on day 7. Furthermore, both the hydrogel-only and no-hydrogel groups showed elevated neutrophil counts after implantation. No viable bacteria were found in the tibiae in the vancomycin-hydrogel group, indicating absence of local infection, whereas in the ‘hydrogel-only’ group 5/5 (one rabbit died, cause unknown), and in the ‘no-hydrogel’ group 5/6 tibiae contained bacteria. Currently, samples are processed to obtain histological results.

Concluding, these preliminary results showed that local application of vancomycin-loaded hydrogel could successfully prevent implant-related infection.

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