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Titel des Beitrags: Systemic versus local application of gentamicin in prophylaxis of implant-related osteomyelitis in a rat model.

Abstract: Administration of perioperative antibiotic prophylaxis is a routine procedure in orthopedic surgery. Besides systemic prophylaxis, only few techniques are established for local application of antibiotics to reduce infection related to orthopedic implants. The aim of this study was to evaluate the efficacy of locally versus systemically applied gentamicin in a rat model (n = 60). For local application, the antibiotic was delivered from a biodegradable poly(D,L-lactide) (PDLLA) coating of titanium implants. The efficacy of local prophylaxis was compared to a systemic single shot application of gentamicin as well as a combination of both administrations. Half of the animals received a weight-adopted single shot application of gentamicin 30 min prior to surgery. At surgery, the medullary cavities of the tibiae were contaminated with Staphylococcus aureus (10(2) colony forming units /CFU) and titanium Kirschner wires were implanted into the medullary canals. The implants were either uncoated, PDLLA coated, or coated with PDLLA + 10% w/w gentamicin. The animals were followed up for 42 days. X-ray examinations were performed; body weight, temperature, and the clinical condition were determined. After sacrifice, infection was evaluated by histological and microbiological analysis. All animals treated with uncoated or
PDLLA-coated Kirschner wires without systemic application of the antibiotic developed osteomyelitis and all cultures of implants were tested positive on S. aureus. Implant-related osteomyelitis could be prevented by prophylaxis of systemically applied gentamicin in 15% of animals. In contrast, local application of gentamicin delivered from a PDLLA coating was more effective. Onset of infection could be prevented in 90% of animals treated with gentamicin coated Kirschner wires, and in 80% of the animals that were treated with a combination of local and systemic application. The local application from PDLLA-coated implants might support systemic antibiotic prophylaxis in preventing implant-associated osteomyelitis.