Dokumenttyp:  

journal article

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Titel des Beitrags:  

A new model of implant-related osteomyelitis in the metaphysis of rat tibiae.

Abstract:  

Animal models serve as an important tool to understand peri-implant infection. Most of the models use high bacterial loads (>10^4 colony forming units, CFU) to provide high infection rates. Therefore, these animals evolve rather similarly, making comparison between groups and statistical analysis possible. On the other hand, to mimic clinical constellation of surgery-related infections the use of low amounts of bacteria would be more advantageous. We developed a metaphyseal rat model of peri-implant bone infection with low amount of bacterial loads (10^2 and 10^3 CFU of Staphylococcus aureus) and investigated osseointegration of the implants coated with hydroxyapatite (HA) and low-dosed HA-silver (HA-Ag). Non-infected implants served as controls. After 6 weeks rats were sacrificed and implants evaluated for osseointegration and infection. Infection of implanted devices was reliably induced, independently whether 10^2 or 10^3 CFU of S. aureus were inoculated and HA or HA-Ag coated implants were used. No systemic infection was present in any of the animals at the time of sacrifice, and no animal developed acute infection requiring premature sacrifice. All CFU counts of the implant and the bone at sacrifice were significantly
higher than the inoculated load (p< .05). All steriley inserted implants showed excellent osseointegration and no infection. Our present study of a rat tibia model reliably induced osteomyelitis in the metaphysis with low-doses of bacteria. The addition of low-dosed Ag to the implant coating was not able to reduce the infection rates. The results demonstrate that it is possible to develop a model of implant-related osteomyelitis in rats with low amounts of bacteria to better mimic clinical constellations. No other promoters of infection besides insertion of the screw implant were used in this model.