Efficacy of antibacterial-loaded coating in acutely highly contaminated implant.

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Post-surgical infections represent a common healthcare problem, with *Methicillin-resistant Staphylococcus aureus* (MRSA) being the leading microorganism involved, and different treatment strategies can be adopted to counteract them. Recently, hydrogels represent promising and potential alternative materials able to locally convey antibiotics and regulate bone bacterial infections related to orthopedic devices. The aim of the present study was to test the ability of an antibacterial-loaded bioreabsorbable hydrogel coating, obtained by derivatization of low molecular weight hyaluronic acid (HA) with poly-D,L-lactic acid (PDLLA) - DAC®, to reduce acute bacterial colonization in an in vivo model of an intra-operatively highly contaminated implant. After having verified that DAC® showed no cytotoxic, genotoxic and histotoxicity effects, MRSA were inoculated in the femur of forty adult New Zealand rabbits at the time of intra-medullary nailing. Immediately after inoculation, sandblasted titanium nails, 3 mm in diameter and 40 mm in length were coated directly by the surgeon before implantation with DAC® hydrogel loaded with 0%, 2% or 5% (w/v) vancomycin respectively and implanted through the same surgical access. Vancomycin-loaded DAC® coated nails were compared to controls as to regard local and systemic infection development. After seven days from implant, none of the rabbits receiving vancomycin-loaded DAC® nail showed positive blood cultures, compared to all the controls; vancomycin-loaded DAC® coating was associated with local bacterial load reduction ranging from 72% to 99%, compared to controls. To sum up, the present study provided evidence that vancomycin-loaded DAC® coating significantly reduces acute local and systemic bacterial count following high local MRSA contamination of an intra-medullary nail, in an animal model, without detectable side effects. Antibacterial-loaded DAC® coating may represent a possible option to protect orthopaedic implants from bacterial colonization, provided that further studies will confirm its efficacy in vivo and in the clinical setting.