A novel porcine model of implant associated osteomyelitis: a comprehensive analysis of local, regional and systemic response - DTU Orbit (06/01/2019)

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Pigs are favorable experimental animals for infectious diseases in humans. However, implant associated osteomyelitis (IAO) models in pigs have only been evaluated using high-inoculum infection (>10⁸ CFU) models in 1975 and 1993.

Therefore, the aim of this paper was to present a new low inoculum porcine model of human IAO based on 42 experimental pigs. The model was created by drilling an implant cavity in the tibial bone followed by insertion of a small steel implant and simultaneous inoculation of Staphylococcus aureus bacteria (n=32) or saline (n=10). The infected pigs were either inoculated with 10⁴ CFU (n=26) or 10² and 10³ CFU (n=6). All animals were euthanized five days after insertion of implants. Pigs receiving the high-inoculum infections showed a significantly higher volume of bone lesion, number of neutrophils around the implant, concentrations of acute phase proteins in serum and enlargement of regional lymph nodes. A positive correlation was present between a high number of surrounding neutrophils and high values of all other parameters. Furthermore, a threshold of 40 neutrophils per 10 high power fields for the histopathological diagnosis of high grade IAO was defined. In conclusion: this paper describes a novel low-inoculum S. aureus porcine model of IAO which was demonstrated to be reliable, reproducible and discriminative to human IAO, and represents a requested and valuable tool in orthopedic research. This article is protected by copyright. All rights reserved.