

The treatment of experimental osteomyelitis by surgical debridement and the implantation of calcium sulfate tobramycin pellets

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Calcium sulfate was used as a biodegradable delivery system for the administration of antibiotics in musculoskeletal infection. New Zealand white rabbits were infected with *Staphylococcus aureus*, debrided, and randomized to one of four treatment groups: calcium sulfate pellets with 10% tobramycin sulfate, placebo calcium sulfate pellets and IM tobramycin, placebo calcium sulfate pellets, or debridement. Serum and wound exudate tobramycin concentrations and serum calcium levels were measured. Radiographs, cultures, and histology were analyzed for efficacy and treatment. Rabbits treated with 10% tobramycin sulfate pellets showed a significantly higher eradication of infection (11/13) than rabbits treated with debridement only (5/12), placebo pellets and IM tobramycin (5/14), or placebo pellets (3/13). In the group receiving 10% tobramycin sulfate pellets, serum tobramycin concentrations peaked 3 h post-operatively at 5.87 microg/ml and were non-detectable after day 1. In the group receiving placebo pellets and IM tobramycin, serum concentrations peaked at 7.82 microg/ml 1 h post-operatively, fell to 6.12 microg/ml on day 2, and averaged 4.18 microg/ml for the remainder of the treatment period. The wound exudate tobramycin concentrations in the animals treated with tobramycin sulfate pellets peaked at 11.9 mg/ml on day 1 and dropped to 2.5 microg/ml on day 7. There was no significant difference in the serum calcium levels in any of the treatment groups. Calcium sulfate containing tobramycin sulfate has potential utility as a biodegradable local antibiotic delivery system in the treatment of musculoskeletal infections.