The use of tissue sealants to deliver antibiotics to an orthopaedic surgical site with a titanium implant.

Authors: Cashman JD, Jackson JK, Mugabe C, Gilchrist S, Ball K, Tredwell S, Burt HM

Publication Date: 2013

Abstract:

BACKGROUND: Orthopaedic surgery is associated with unacceptable infection rates that respond poorly to systemic antibiotics. The objective of this study was to use an animal model for orthopaedic implant infection to examine the ability of a new-generation fibrin tissue sealant to effectively deliver antibiotics to the surgical site.

METHODS: The antibiotics cefazolin, fusidic acid or 5-fluorouracil were blended into Vitagel tissue sealant. The release rate of the drugs was measured using HPLC methods and bioactivity was measured by the zone of inhibition method with pathogenic Staphylococcus aureus. The antibiotic activity of the drug-loaded sealant was then tested in rats using infected orthopaedic surgical sites (titanium clip on spine). Efficacy was evaluated by residual bacterial counts on clips, clinical observations of infection, and histological findings.

RESULTS: The drugs were released in a controlled manner over 2-4 days. All three antibiotics demonstrated strong antibacterial activity when released from the sealants. None of the treated animals demonstrated systemic illness. Post mortem dissection revealed a well-encapsulated abscess surrounding the titanium clip with erosion of the bony process. Using an inoculum of 1-5 x 10(3) CFU, treatment with antibiotic-loaded fibrin sealant demonstrated reduced infective swelling and reduced bacterial counts on surgical clip swabs compared to control rats or rats treated with antibiotic only. This model allowed for almost 100 % infectivity with a 0 % mortality rate due to

infection, mimicking the clinical features of human implant infection.

CONCLUSION: The results support the use of antibiotic-loaded commercially available fibrin sealants to prevent infection after implant surgery.