Introduction: Postoperative spine infections are a taxing complication and cause significant morbidity. Patients are subjected to long-term antibiotics and often revision surgery with instrumentation removal. Electrical current through hardware detaches biofilm allowing antibiotic penetration. Capacitive coupling delivers a safe dose of alternating current through non-invasive electrodes. We hypothesized that capacitive coupling in addition to antibiotics would decrease infection rate compared to antibiotics alone.

Methods: Thirty rabbits were subjected to a well established spine infection model with systemic ceftriaxone prophylaxis. Two noncontiguous titanium rods were implanted inside dead space defects at L3 and L6. All sites were challenged with 10e6 colony forming units of Staphylococcus aureus. Rabbits were then randomly treated with either a capacitive coupling or control device. The capacitive coupling field encompassed both of the noncontiguous sites. Both instrumentation and soft tissue bacterial growth was assessed after 7 days using a standardized quantification technique.

Results: Capacitive coupling treated sites showed a statistically significant decrease in titanium rod infection. The incidence of capacitive coupling treated hardware infection was 41% compared with 88% in the control group (p< 0.05). However, there was no statistical difference in soft tissue infection rates. In addition, soft tissue bacterial load was not decreased with capacitive coupling use. There was a trend towards decreased infection incidence in sites treated with continuous capacitive coupling therapy when compared to intermittent therapy.

Conclusion: Capacitive coupling non-invasively delivers an alternating current that detaches biofilm from instrumentation. Long term, capacitive coupling may aid in treatment of biomaterial-centered spine infections; bacterial eradication may be successful without removal of instrumentation allowing for improved stability.