Antiseptic Solutions in Knee Arthroplasty: Does Efficacy against Biofilm Change on Different Surfaces?

Tyler Kim Khilnani, Zachary James Coles, Christina A Chao, Mathias P G Bostrom[1], Alberto V Carli
[1]Hospital For Special Surgery

INTRODUCTION: Antiseptic irrigation solutions are commonly utilized during arthroplasty surgery to prevent and treat periprosthetic joint infection (PJI). Although the comparative effect of antiseptic solutions on bacterial biofilm formed on porous titanium and polymethylmethacrylate have been investigated, little is known on femoral implant surfaces commonly utilized in total knee arthroplasty, including cobalt-chrome (CC) and oxidized zirconium (OxZr). We sought to determine which antiseptic solution is most effective in eradicating mature staphylococcal biofilm formed *in vitro* on OxZr versus CC.

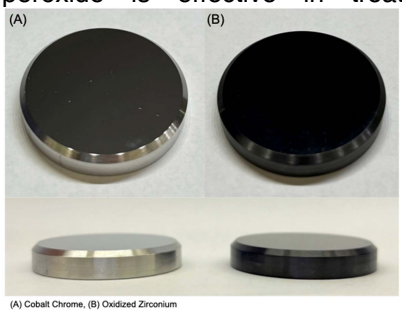
METHODS:

MSSA biofilm (Xen36) was grown on identically sized CC and OxZr non-porous coupons for 24- (immature) and 72-hour (mature) durations. Following biofilm establishment, coupons were rinsed with PBS to remove planktonic bacteria, then treated for 3 minutes with one of the following antiseptic solutions: 10% povidone-iodine (10%PI), a 1:1 mixture of 10% povidone-iodine plus 3% hydrogen peroxide (PI+HP), diluted povidone-iodine (0.35%; dPI), and 0.05% chlorhexidine gluconate in sterile water (CGW). Treated and control coupons were sonicated in tryptic soy broth and plated to count colony forming units (CFUs). Experiments were performed in quadruplicate and repeated. Antiseptic solutions that produced 3-log reductions versus controls were considered to reach clinical efficacy.

RESULTS: Biofilms were reliably grown on both OxZr and CC surfaces in pilot experiments. Antiseptic efficacy was not affected by surface type. In total, 10%PI and PI+HP were efficacious at all timepoints. dPi and CGW did not meet criteria for efficacy on immature or mature biofilms.

DISCUSSION AND CONCLUSION:

Similar to our previous investigations on porous titanium and polymethylmethacrylate, 10%PI with or without HP was effective in significantly reducing bacterial counts in immature and mature biofilm on both CC and OxZr. There was no difference in solution efficacy between the CC and OxZr. Undiluted sterile povidone-iodine with or without hydrogen peroxide is effective in treating established MSSA biofilm on Cobalt Chrome and Oxidized Zirconium.



(A) Cobalt Chrome, (B) Oxidized Zirconium