Local Bio-absorbable Antibiotic Delivery in Calcium Sulfate Beads in Hip and Knee Arthroplasty

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INTRODUCTION: Infections in total joint arthroplasty are devastating occurrences to the patient in terms of morbidity, functional outcome, and financial burden. Great effort in the prevention and treatment of arthroplasty associated infection has been conducted.

Recently, antibiotic impregnated calcium sulfate (AICS) beads have been used for prevention and treatment of periprosthetic joint infections. The role of AICS beads as an antibiotic delivery vehicle for primary prevention of infection or the treatment of infection in the setting of total hip and knee arthroplasty has not been fully studied. Recent studies have reported increased wound complication and drainage with AICS use. This study is a retrospective review evaluating the occurrence of post-operative infection and wound complications following the use of calcium sulfate beads as a local antibiotic delivery system.

METHODS: From February 2011 to May 2012, 56 patients received 100% pure calcium sulfate beads (STIMULAN, Biocomposites, Wilmington, NC) mixed with tobramycin, vancomycin, and cefazolin for primary prevention of infection in high risk patients and/or eradication of established infection in patients undergoing either primary or revision knee and hip arthroplasty. Primary outcomes included evaluation of wound complications such as persistent wound drainage, purulent exudate, local tissue irritation, systemic toxicity, heterotrophic ossification, and need for further surgery. Secondary outcomes included reoperationg and reinfection rates. Approval was obtained from our Institutional Review Board.

RESULTS SECTION: 56 patients met inclusion criteria for this study; 26 knee arthroplasty and 30 hip arthroplasty patients. Of the knee arthroplasty patients, 6 were primary, 12 were clean revisions, and 8 infected revisions. Of the hip arthroplasty patients, 5 were primary, 19 were clean revisions, and 6 were infected revisions.

Radiographic evidence of bead placement was confirmed on the post-operative xray for all patients. Complete resorption was radiographically confirmed in all patients by 6 weeks. One case (1.7%) of persistent wound drainage occurred in a patient with type 2 diabetes mellitus. No post-operative infections were seen in any of the patients and no cases of heterotrophic ossification were found. One patient who underwent a clean TKR showed radiographic signs of intra-articular ossification which correlated clinically with her persistent knee pain. She required surgical irrigation and a poly exchange.

DISCUSSION: Our cohort had only one patient (1.7%) with prolonged serous wound drainage with use of 100% pure antibiotic impregnated calcium sulfate beads in total joint arthroplasty. Additionally, this patient was a type II diabetic undergoing revision knee arthroplasty. The other observed complication was painful intra-articular calcifications in a woman who underwent revision knee arthroplasty after traumatic dislocation of original knee arthroplasty. Use of 100% pure calcium sulfate AICS beads may help reduce post-operative wound complications.
As the number of arthroplasty surgery increasing in the United States, the number of PJI will increase. Management strategies for PJI include preoperative, intraoperative and postoperative interventions. AICS appears to be a safe adjunct tool in the application of local antibiotic delivery.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): Use of high purity calcium sulfate antibiotic impregnated calcium sulfate beads had low serous wound drainage with use in total joint arthroplasty.

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