

Long-Term Implantation of Polymethylmethacrylate Antibiotic Beads at a Fracture Site

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Purpose: Polymethylmethacrylate (PMMA) antibiotic beads can be an effective treatment for open fractures and chronic osteomyelitis. High drug concentrations can be delivered locally without having systemic effects with an additional benefit of not requiring patient compliance. It is not clear whether the beads cause long-term adverse events if not removed. There are risks with performing an additional operation to remove the beads. The aim of this study was to determine if removal of antibiotic beads was required to avoid long-term complications.

Methods: A retrospective chart review at a Level I regional trauma center was conducted on patients with an extremity or pelvis fracture that had implantation of PMMA antibiotic beads from 2008-2013. The PMMA beads were pre-made by pharmacy, containing vancomycin, tobramycin, or both antibiotics. Exclusion criteria include age less than 18 years, patients treated in staged surgical manner, follow-up less than 6 weeks, and spine cases. The orthopaedic outpatient notes were reviewed for the clinical evidence of infection or painful beads based on history or examination. On those patients who underwent removal, the surgical reports and the intraoperative culture data were reviewed.

Results: 370 patients had PMMA antibiotic beads placed by an orthopaedic surgeon at our institution from 2008-2013. 49 patients met criteria for our study; the majority were excluded for planned staged surgical management. Average follow-up was 35 weeks (range, 6-269 weeks). 31 patients (63%) did not undergo bead removal and there were no wound complications at long-term follow-up. 17 patients (34%) underwent unplanned surgical bead removal. 11 of those patients (22%) had delayed wound healing and removal within 90 days of placement during repeat surgical debridement. Four patients (8%) had complete wound healing, but had removal during fracture nonunion repair or total joint arthroplasty. In patients with complete wound healing prior to removal, there was no purulence found intraoperatively during PMMA bead removal and intraoperative cultures were negative. Two patients (4%) had removal because of PMMA bead protuberance in areas of thin subcutaneous tissue causing pain. No patients developed antibiotic resistance, although three patients had new bacteria identified on repeat cultures.

Conclusion: PMMA antibiotic beads can be utilized in musculoskeletal infections and do not need to be removed in all patients. Patients who had complete wound healing after placement of beads, did not have repeat surgical debridement for wound complications. PMMA beads do not necessarily harbor an environment for infection or promote antibiotic resistance. However, the PMMA beads may need to be removed during repeat surgical debridement for delayed wound healing or in areas of thin subcutaneous tissue.