

A Unique Instance of The excess of calcium in After Using Calcium Sulphate Pearls.

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CASE REPORT

Here, we present the first instance of severe, symptomatic hypercalcemia that has been documented after the use of surgically implanted calcium-based beads into a hip replacement. For the purpose of publication, the patient's agreement has been sought for the clinical history and x-rays. Due to degenerative osteoarthritis, a 72-year-old Caucasian female underwent her first total hip arthroplasty (THA) on April 21, 2014. The procedure involved an 11 mm high offset Taperloc Complete stemTM, 50 mm Tri-Spike acetabulumTM, 44 mm E-poly active articulation, and a 28 mm ceramic head. During the procedure, eburnated bone and severe hip arthofibrosis were found. She arrived at the ER on May 29, 2014, complaining of low-grade fever (37.5), significant hip pain, and redness around the surgery site and moderate leukocytosis (82.8%) with neutrophilia (white blood cell (WBC) count of 11 K/ μ L). Early blood cultures showed no signs of growth. A Biomet[®] 50 mm polyethylene Freedom acetabulumTM, 36 mm head Freedom headTM, and ultra-high dosage antibiotic cocktail were used in her revision. She had purulent fluid all over her hip after surgery, and methicillin-resistant *Staphylococcus aureus* grew as a result. Early in August 2014, she experienced excruciating pain again, and on August 18, 2014, she was readmitted once more. Leukocytosis (WBC, 17.8 K/ μ L) was discovered, and she underwent a second revision involving the implantation of a 190 mm Arcos STS stemTM and a 56 mm Regenerex acetabulum.

During this process, there was erythema for a while, but there was no clear purulence, and the cultures that were performed later on showed no signs of growth. An extra three screws were inserted for security. Implanted around and medial to the prosthesis and hip joint were antibiotic-impregnated calcium sulphate beads (AICBs), made with OsteosetTM beads and containing, in this instance, 2 g of Vancomycin and 3.6 g of Tobramycin, as manufactured by the hospital pharmacy department in accordance with company-issued instructions (Figure 1). Her haemoglobin level dropped to 4.7 g/dL due to Coombs positive hemolytic anaemia, which initially hampered her post-operative treatment and necessitated many blood transfusions. On day three, the uncorrected serum calcium levels started to rise to 10.7 mg/dL. After the fourth post-operative day, calcium levels rose even more (13.3 mg/dL). Ionised calcium levels were 7.55 mg/dL at that point, reaching a peak of 14.5 mg/dL on day 5, then declining to a normal level on day 8 following surgery (Figure 2). A hip x-ray taken immediately after surgery showed the radio-opaque beads were mostly positioned medially around the right hip. Surprisingly, on post-operative day 5, the beads were no longer radio-opaque on the x-ray (Figure 1), indicating nearly full absorption. The patient was confused and had a wobbly stride, all signs of acute delirium. Systolic pressures of less than 140 mm Hg have been regularly maintained in her blood pressure, peaking at 178/72 on the sixth post-operative day. It was impossible for her to take part in physical treatment.

She had a medical history of anxiety, hypertension, and osteoarthritis. Vitamin D supplements (1000 IU daily), acetaminophen, diphenhydramine, fluoxetine, ketorolac, gabapentin, folacin, cyano-cobalamin, pyridoxine, pantoprazole, and magnesium sulphate were among the post-operative drugs prescribed. Her physical examination was essentially ordinary; the only relevant finding was a clean, healing surgical incision. Serum protein electrophoresis, vitamin D profile, parathyroid (PTH) and PTH-related peptide levels, and a comprehensive examination were all unrevealing (Table 1). We think that the hypercalcemia that corresponded with calcium levels as seen on the graph (Figure 2) was caused by the AICBs' fast absorption. Her creatinine climbed to 2.12 mg/dL in June,

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indicating a mild renal damage; however, at the time of readmission in August's creatinine had decreased to 1.14 mg/dL throughout this most recent hospital stay, with very slight fluctuations. Intravenous saline treatment was administered to the patient in an aggressive manner, with an initial rate of 100 cc/hour and a subsequent increase to 200 cc/hour during her peak blood calcium levels. She was prescribed 10 mg of amlodipine orally every day to treat her hypertension. On the seventh postoperative day following surgery, a single 200 IU/mL subcutaneous dosage of calcitonin was given. Other therapeutic alternatives, such as increasing the dosage of calcitonin, using bisphosphonates, and using loop diuretics, were thought to be inappropriate. Aggressive intravenous fluid therapy was immediately responsive to the patient, and the confusion and delirium subsided as the serum calcium level rose. Finally, she was sent to a nearby rehabilitation facility on the ninth post-operative day. In subsequent visits, she TALK

As far as we are aware, no prior reports of hypercalcemia have been made after using AICBs during any kind of periprosthetic procedure. Because AICBs can serve as a vehicle for local antibiotic delivery as well as an alternative for bone grafts, they are becoming more commonly used in orthopaedic surgery. antibiotic resistance In post-operative orthopaedic surgery, *Staphylococcus aureus* (MRSA) is the predominant infectious pathogen. Targeted local administration of antibiotics, such as Vancomycin, can greatly enhance patient outcomes. AICB manufacturers caution against taking the product if you have temporary hypercalcemia, although they have not measured this risk. Prior research with AICBs revealed absorption rates of approximately 93% after one month and 100% after three.

1. X-rays obtained on the fifth post-operative day, in contrast to these accounts, revealed almost total absorption at the surgical site. Together with the sharp increase in serum calcium, our x-rays clearly show a clear association between hypercalcemia and AICB absorption, even in the context of an otherwise ordinary serological assessment. Due to the hypercalcemia, the patient experienced an acute encephalopathy that made it impossible for them to engage in traditional physical therapy following surgery and increased their risk of falling and aspirating. Why the beads absorbed in this instance at such an unusually quick rate is unknown. Our group hypothesises that this might be because most of the beads are positioned in nearby vascular soft tissue, or there might be a reaction between the antibiotics and the beads. that improved the solubility. Although the dosage may have been excessive, the degree of hypercalcemia

rather than the rate of absorption should have been impacted by this. In the future, AICB use is advised in conjunction with pre- and post-operative testing for renal function, phosphate levels, and post-operative hypercalcemic symptoms. Serum ionised calcium levels should also be monitored during the days following the procedure. If fluids are insufficient to alleviate the hypercalcemia, it may be necessary to explore alternative treatments like loop diuretics or hemodialysis.

Hip arthroplasty is a frequent surgical surgery; in 2010, there were an estimated 168,000 cases performed on those over 65. By 2030, hip revision procedures are anticipated to double by 2026, accounting for a 174% rise in procedures to approximately 600,000 annually in the United States;3 Furthermore, MRSA infections in periprosthetic surgeries have historically occurred in main surgeries at a rate of 1-2% and in revision surgeries at a rate of 3-4%1,4. It is anticipated that as the number of procedures increases, so will the use of AICBs. The usage of calcium beads in conjunction with antibiotics is not recommended, and the AICB guidelines solely address the use of calcium beads by itself. We also urge additional research on the absorption rates of AICBs because the current reason for the quick absorption of calcium in our case is unknown.

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