



Simultaneous bilateral resection total shoulder arthroplasty with anatomic antibiotic cement spacer retention

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Periprosthetic shoulder infection (PSI) is a challenging problem that may lead to shoulder pain, dysfunction, and even death. The reported incidence of infection after shoulder arthroplasty ranges from 0% to 4%.^{7,14,16} Recent developments have improved our ability to diagnose and to treat this condition.

To date, there is no consensus on the optimal treatment of patients with PSI. To our knowledge, no reports of simultaneous bilateral resection total shoulder arthroplasty (TSA) and cement spacer placement exist in the literature. We report one such case with a 25-month follow-up.

Case report

A 66-year-old, right-hand-dominant man presented to our clinic for evaluation of bilateral painful TSA. Past medical history included hypertension, prostate cancer in remission, fatty liver, alcoholism, obstructive sleep apnea, and bilateral total hip arthroplasties performed 3 and 4 years before presentation.

He had undergone bilateral TSA 14 months before presentation (right) and 26 months before presentation (left) at an outside institution (ReUnion TSA; Stryker, Kalamazoo, MI, USA). The patient did well until 3 months before presentation, when he developed bilateral shoulder pain and stiffness. Two weeks later, he developed septic arthritis of the right wrist and underwent open irrigation

and débridement, with synovial fluid cultures positive for *Staphylococcus aureus* (methicillin-sensitive *S. aureus*). The patient was prescribed 6 weeks of intravenous cefazolin and noted that his shoulder symptoms resolved while he was taking antibiotics.

Approximately 10 days after completion of antibiotics, the patient's shoulder symptoms returned to a level worse than they had been previously. He presented to an outside emergency department, where aspiration of the left shoulder, which was more symptomatic, yielded a white blood cell count of 57,000/ μ L, erythrocyte sedimentation rate (ESR) of 86 mm/h, and C-reactive protein (CRP) level of 9 mg/L. Synovial aspirate and blood cultures were positive once again for *S. aureus*. The patient underwent bilateral arthroscopic shoulder irrigation and débridement. The glenoid components were noted to be loose bilaterally but were retained. Cultures again grew *S. aureus*, and the patient was prescribed intravenous cefazolin and rifampin. It was at this point that the patient was transferred to our care.

On presentation to our clinic, the patient was afebrile with diffuse erythema of both deltopectoral incisions without frank drainage or fluctuance. The arthroscopic portal incisions bilaterally were healing well with no evidence of infection. The patient had painful and restricted active and passive range of motion. Radiographs obtained in our office demonstrated oversized humeral head components with humeral bone resorption at the calcar bilaterally and evidence of a grossly loose glenoid component on the right side (Fig. 1). Laboratory studies were notable for a white blood cell count of 7.3×10^9 /L, ESR of 94 mm/h, and CRP level of 11.5 mg/L.

Given the clinical presentation and chronicity of the infections, the decision was made to proceed with bilateral resection TSA and placement of antibiotic spacers. The operative plan was to begin with the more symptomatic side and, if the patient was hemodynamically stable, to continue with removal of components from the contralateral side.

This study was conducted under the approval by the Institutional Review Board at Stanford University: Protocol ID#15922, IRB#5136.

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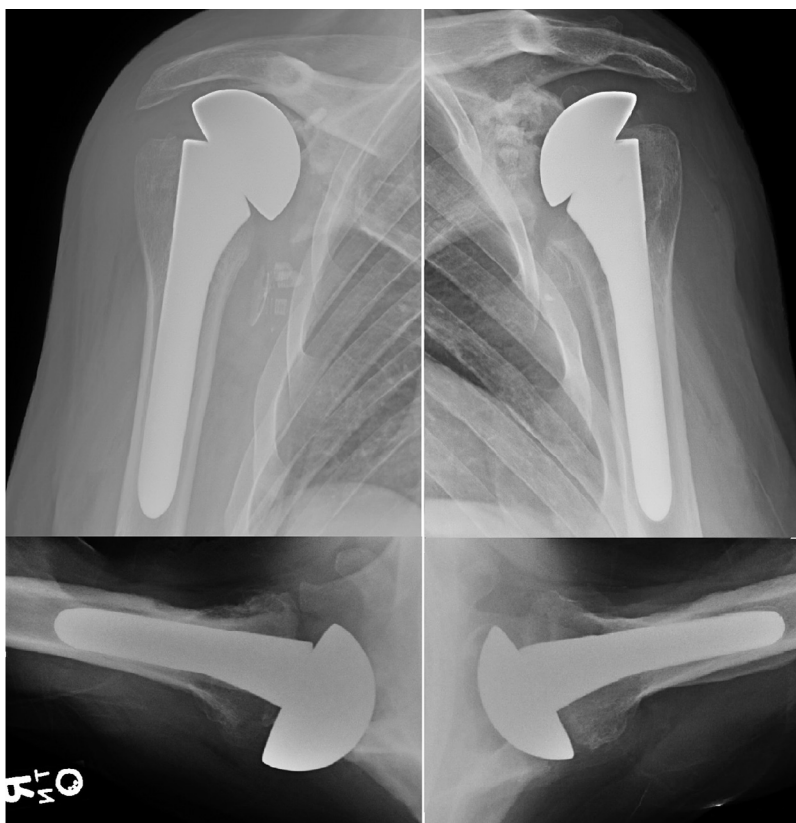


Figure 1 Preoperative Grashey anteroposterior and axillary lateral radiographs.

Surgical procedure

Surgery was performed in the beach chair position (T-MAX; Smith & Nephew, Andover, MA, USA) with both shoulders prepared and draped. The patient's prior deltopectoral incision was used to approach the right shoulder. Abundant purulent material was noted within the joint, and multiple specimens were obtained for microbiologic analysis. The subscapularis tendon was torn and retracted with poor muscle and tendon quality; it was not amenable to later repair. The remainder of the rotator cuff was thin but intact. The humeral component was well fixed, and the glenoid component was completely loose and displaced inferior to the glenoid. All components were extracted, and the glenoid surface, peg holes, and humeral medullary canal were thoroughly cleansed. A thorough débridement of all nonviable soft tissue and irrigation were performed.

At this point, given the relative ease of resection and the patient's hemodynamic stability, we proceeded with the contralateral side. A similar surgical approach and technique were employed on the left side. The subscapularis was released and was amenable to later repair. The remainder of the rotator cuff was thin but intact. Seven culture specimens of fluid and tissue were taken from each side.

Bilateral antibiotic cement spacers (StageOne; Biomet, Warsaw, IN, USA) were made and placed in a press-fit fashion in 30° of retroversion relative to the forearm axis; 1 g of vancomycin powder was added to each bag of cement, which already contained gentamycin. Two deep drains were placed in each shoulder, and the subscapularis was repaired on the left side using a polydioxanone (PDS) suture (Ethicon, Johnson & Johnson, Somerville, NJ, USA) through bone tunnels. Both shoulders were placed in sling immobilization (UltraSling II; DonJoy, Vista, CA, USA).

Cultures from both sides failed to grow any organisms. The orthopedic infectious disease service was consulted and recommended a continued course of intravenous cefazolin on the basis of cultures and sensitivities from prior procedures and also intraoperative clinical findings that clearly demonstrated deep infection. The patient was discharged to a skilled nursing facility on postoperative day 5 with both incisions appearing benign.

The patient was then seen for follow-up on postoperative day 11. Given right shoulder wound drainage and erythema, the patient was readmitted to the hospital and underwent repeated irrigation and débridement of the right shoulder. A large hematoma was evacuated, and no purulent material was noted. Drain output was minimal while the patient was in the hospital, and on postoperative day 2, the patient was discharged once again to his skilled nursing facility.

After surgery, the patient was placed in a sling once again and allowed immediate pendulum exercises, passive shoulder range of motion exercises, and unrestricted motion of the elbow, wrist, and hand bilaterally. At 6 weeks after surgery, slings were discontinued, and active range of motion was allowed. At 3 months after surgery, strengthening exercises were initiated. Serial postoperative radiographs were obtained at regular intervals, confirming stable position of the cement spacers and no evidence of static instability.

At his most recent follow-up (25 months), the patient has completed 6 weeks of intravenous cefazolin followed by 3 months of oral cephalexin. His infectious markers have normalized (white blood cell count, ESR, CRP level). His shoulders are pain free, and he requires no opiates or other anti-inflammatories or analgesics. He has been able to resume activities of daily living without significant limitations (Fig. 2) with bilateral active elevation of 130°. Radiographs of his shoulders demonstrate stable positions of bilateral cement

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