25 Failed Reverse Shoulder Arthroplasty: Case Example 1

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25.1 Introduction

The number of primary total shoulder arthroplasties (TSA) has increased exponentially in recent years, with a corresponding increase in the number of revision procedures. The infection rate after primary shoulder arthroplasties has a reported incidence of 0.4–2.9% [1, 2].

Reverse arthroplasties, young age, male gender and trauma-related arthroplasties all have greater risks of infection [3]. The infection rate also increases in incidence with every subsequent revision [4].

The treatment is challenging due to the increasing resistance of infectious organisms and the burden of the patients. The numbers of shoulder arthroplasties are few compared to hip and knee arthroplasties, and surgeons' experience remains limited. However, the management of periprosthetic joint infection (PJI) can to some extent be compared regardless of which joint is affected.

Unlike hip and knee infections, revision shoulder arthroplasties are often culture-positive for *Propionibacteria*. The functional outcomes of revising *Propionibacteria* culture-positive failed arthroplasties with a single-stage revision and immediate antibiotic therapy are not necessarily inferior to the clinical outcomes of revising failed shoulder arthroplasties that are not culture-positive [5].

For an early PJI the recommendations in general would be a soft tissue debridement with change of head/glenosphere and/or polyethylene components.

For a delayed PJI, more than 3 months after primary arthroplasty, the most common treatment is a two-staged revision of the arthroplasty. Time window between the two surgeries depends on microorganism and blood samples. Some surgeons prefer one-stage revision. Irrigation and debridement with component retention and chronic antibiotic suppression is another alternative for the management of acute or late hematogenous deep periprosthetic shoulder infection. Recently, Dennison et al. [6] reported 70% component retention after irrigation and debridement. Most patients were prescribed chronic antibiotic suppression therapy, and reasonable motion was maintained.

Regarding antibiotic treatment, it is important to have an antibiotic-free interval before revision surgery. This will increase the likelihood of having positive cultures. The treatment with empiric antibiotics should be initiated immediately after sampling during revision surgery. The samples have to be cultured for at least 14 days in shoulder revisions because of the slow-growing propionibacterium. Involvement of an infectologist is recommended for all these patients. Intravenous

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antibiotics should be administered for at least 14 days and oral antibiotics subsequent at least 6 weeks.

25.2 Case Presentation

Our case is a male born 1939. He had been permanently out of work since 1983 due to back pain when first admitted to an orthopaedic surgeon for pain in his right shoulder. He had been a manual factory worker. This first visit was in 2000 and he complained of reduced range of motion in the shoulder. X-rays showed osteoarthritis in the glenohumeral joint with flattening of the humeral head and subchondral sclerosis on the glenoid side. The patient was 61 years old and the surgeon considered arthrodesis or TSA.

In 2002, he was operated with an uncemented TSA in his right shoulder. In 2011, he experienced increasing pain and was referred to a shoulder specialist. At this point, he had pain at rest and could only use the arm close to the body.

X-rays showed lucency around the glenoid peg and a strange contour on the metal backing. There was a broken screw in the glenoid and extensive wear of the polyethylene (PE) components. The head of the prosthesis was cranially migrated indicating that supraspinatus was not efficient (Fig. 25.1). At the clinical exam, he showed subscapularis weakness. Infraspinatus and teres minor were acceptable, and he could contract all three parts of the deltoid muscle.

The only possible solution was revision to a reverse shoulder arthroplasty (RSA). The patient was informed about possible complications in form of nerve injury and infection. Both the patient and the surgeon needed some time to decide for operation or not. After 3 more years, in 2014, the decision was made to operate.

In preoperative planning, we had to consider bone grafting and risk of fractures. We normally use autograft from iliac crest or frozen allografts from retained femoral heads. In revision cases, poor quality of glenoid bone may occur, and the surgeon should prepare for bone grafting to achieve good fixation of the metaglene component. To prevent fracture lines in the humerus, it is sometimes advisable to protect with a cerclage before chiselling along the stem. It is also advisable to make a controlled osteotomy rather than risk an uncontrolled fracture.

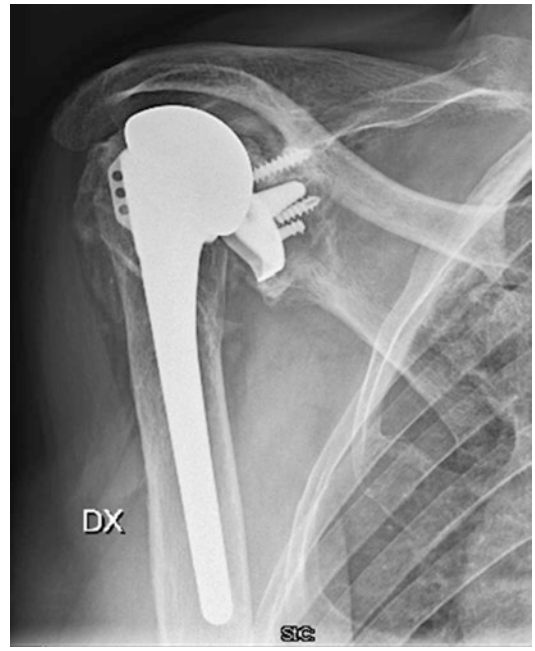

Fig. 25.1 X-rays of failed TSA show anterior-superior dislocation of the humerus. There was a broken screw in the metal-backed glenoid component

As in revision cases, the index operation was often performed long ago, and in another hospital, it is very important to acquire exact data on components implanted and to contact the implant provider to have the right equipment for component removal.

For revision surgery, we recommend deltopectoral approach. This approach can be extended in both directions.

In our patient, we found extensive metallosis. The tissue was sticky and grey/black. We tried to remove it as much as possible. The head of the screw was worn and broke when we tried to remove it. In spite of bone loss in the centre of the glenoid, the outer ring was intact, and we used it as a platform for the glenoid baseplate.

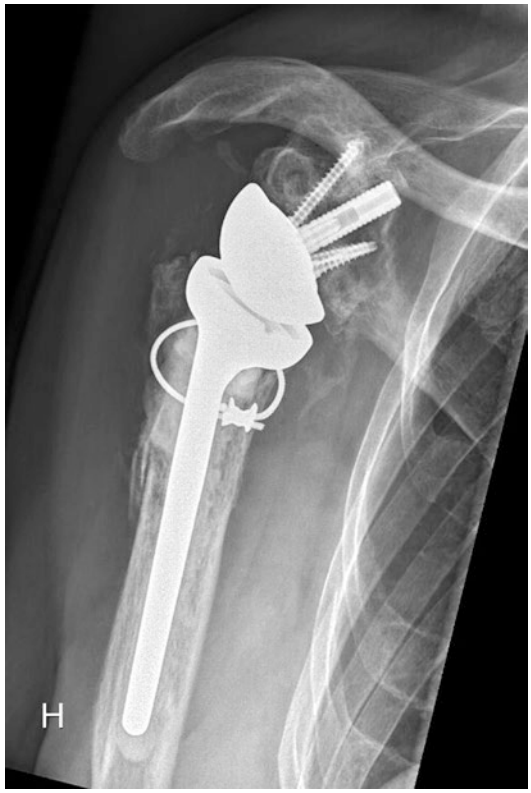

Fig. 25.2 Revision RSA was performed after removal of the primary implant. Glenoid baseplate was fixed with long central peg and screws. Proximal humerus was secured with a cerclage wire to prevent fracture

We put a femoral head allograft inside the intact ring of native glenoid. The glenoid baseplate of revision RSA is usually fixed with screws and a long central peg.

When removing a cemented humeral stem, there is always a high risk of fracturing the humerus. Gradually, it is possible to remove it by chiselling along the stem. The cement mantle can be left inside the bone in cases with no suspicion of infection. This reduces the risk of fractures. We secured the proximal humerus with a cerclage wire in fear of a threatening fracture (Fig. 25.2).

Six weeks after the revision, the patient came to his first follow-up visit. He felt tired and from the wound there had been some secretion of yellow fluid. His general practitioner had given him penicillin tablets. He did not have fever and the blood samples were nearly normal. We told him to quit antibiotics and 2 weeks later performed a soft tissue revision with change of polyethylene liner. There was a 15 mm fistula in the wound all the way in to the implant. Again, there was a lot of metallosis. No purulent secretion could be seen. Standard antibiotics after soft tissue revisions of arthroplasties in our department are intravenous (iv) Ekvacillin (cloxacillin) and vancomycin. Treatment with vancomycin requires careful monitoring to avoid kidney failure.

One week after revision, there was growth of *Propionibacterium avidum* in all seven samples, including bone biopsy. The bacterium was sensitive to penicillin, and the treatment was changed to iv penicillin for 2 weeks and thereafter ciprofloxacin tablets for 3 months.

The patient gradually felt better during the first months after the revision. He had been without antibiotics for 5 months when he showed up with an abscess in the wound. The abscess was drained and he was treated with iv penicillin for 2 weeks. The samples were once again positive for propionibacterium. At this time, the patient was not motivated for any more surgery, and we decided to try lifelong suppression treatment. Ciprofloxacin is not a drug of choice for lifelong treatment because of resistance. Our patient was treated with apocillin (phenoxymethylpenicillin).

Six months later the patient was suffering from fatigue and had red to violet discolouration around the wound. Blood samples were normal. Antibiotics were discontinued for 2 weeks and the patient was revised with insertion of a spacer. The stem was completely loose. There was still extensive grey-black discolouration of subcutaneous tissues as seen with metallosis. We tried to remove all cement from the humerus. The metaglene was completely fixed and had to be chiselled off the glenoid after removing the screws. The bone graft had healed and could be used for implanting a new glenoid component later. To have the option of later rearticulating, we implanted a custom-made spacer (Fig. 25.3).

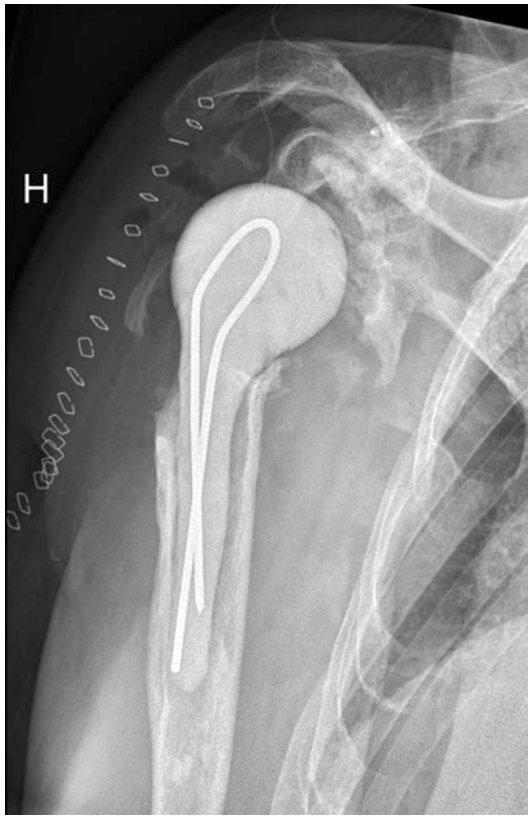

Fig. 25.3 A custom-made cement spacer was implanted after RSA removal

The patient was treated with penicillin and vancomycin in accordance with culture results. Six months later he felt good. Then, no antibiotics were administered for subsequent 3 months. As the patient was not motivated for further surgery, he was followed-up with repeated X-rays every 6 months. At the last follow-up visit, no colour changes were observed in the skin around the wound. He complained some residual pain. The spacer apparently allows limited function and range of motion consisted of approximately 30° of flexion, abduction and extension. At the X-rays there was no visible bone erosion, albeit erosion of the glenoid due to wear from the spacer head could be expected.

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