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Case Report

Proximal Humerus Fractures: A Case Report of Multiple Complications with *Kocuria rosea* Infection

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Abstract

Proximal humerus fractures (PHF) represent approximately 10% of all fractures, with a higher incidence in women. Management strategies vary based on patient factors and fracture patterns, with recent literature supporting surgical intervention, including osteosynthesis or arthroplasty, for complex 3- and 4-part fractures. This case report describes a complex case of a patient with a Neer type II PHF who developed chronic Kocuria rosea infection following reverse shoulder arthroplasty (RSA) after initial osteosynthesis failure. The case highlights the diagnostic and therapeutic challenges in managing such complications, including a rare pathogen and multiple revision surgeries, and underscores the importance of individualized treatment strategies.

Keywords: *Proximal humerus fracture, Reverse shoulder arthroplasty, Kocuria rosea infection*

Introduction

Proximal humerus fractures (PHF) are common injuries, accounting for approximately 10% of all fractures and exhibiting a higher prevalence in females. Treatment decisions are multifactorial, encompassing patient-specific considerations and fracture characteristics. While non-operative management may be suitable for minimally displaced fractures in low-demand individuals, surgical intervention is often indicated for displaced fractures to restore function and stability. Surgical options include osteosynthesis (OTS) using plates or pins and arthroplasty, with reverse total shoulder arthroplasty (RSA) gaining increasing acceptance for complex PHFs.

Case Presentation

A 67-year-old male with a history of hypertension, hyperuricemia, dyslipidemia, and significant smoking (50 pack-years), presented to the Emergency Department (ED) following a fall and direct trauma to his right shoulder, reporting pain and limited range of motion. There were no neurological or vascular deficits. Plain radiography and computed tomography revealed a Neer type II PHF with significant comminution of the tuberosities and displacement of the humeral epiphysis (Figures 1 and 2). Open reduction and internal fixation (ORIF) was performed via the deltopectoral approach with a *PHILLOS* plate and screws Specify type of plate and screws and a synthetic bone graft (Figure 3). The surgery was uneventful, and a simple brachial sling was applied.

Two weeks postoperatively, radiographs demonstrated failure of the ORIF with redislocation of the fracture and intra-articular protrusion of the cephalic screws (Figure 4). Due to the patient's initial refusal of revision surgery, the hardware was removed eight weeks later, and a reverse total shoulder arthroplasty with a cemented stem (Delta Depuy) was performed (Figure 5). The surgery and immediate postoperative period were uneventful.

Figure 1. *Initial Radiography*

Figure 2. *CT Scan*

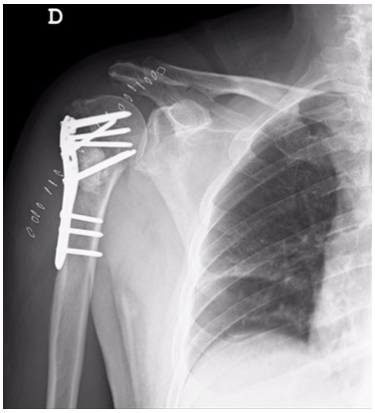

Figure 3. *Post- Op*

Figure 4. *Reduction loss*

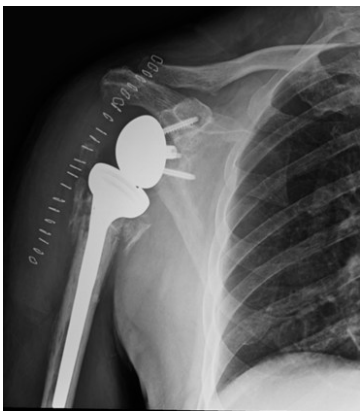

Figure 5. *RSA post op*

Three months post-revision, the surgical site exhibited inflammatory signs (erythema and warmth) with purulent drainage. Initial laboratory investigations were unremarkable for leukocytosis, with a C-reactive protein of 0.51 mg/L and an erythrocyte sedimentation rate of 24 mm/h. Empirical antibiotic therapy was initiated with intravenous Flucloxacilin 1g every 8 hours. Wound cultures grew *Kocuria rosea*, a gram-positive bacterium. Antibiotic therapy was transitioned to targeted oral Cotrimoxazol 960 mg every 8 hours. Bone scintigraphy revealed no evidence of increased radiotracer uptake suggestive of acute periprosthetic infection.

After four weeks of targeted antibiotic therapy, purulent drainage persisted. The patient underwent surgical debridement, polyethylene liner exchange, and humeral head component exchange. Intraoperative cultures were negative. Approximately one month later, purulent drainage recurred, and explantation was recommended, which the patient declined. Chronic suppressive antibiotic therapy with Vancomycin was initiated and continued for three months.

Over the subsequent three years, the patient experienced intermittent episodes of drainage and abscess formation, managed with aspiration and short courses of antibiotics. The patient elected to undergo explantation. The prosthesis was removed, and a humeral spacer impregnated with vancomycin was placed. Cultures from the explanted prosthesis grew Staphylococcus epidermidis. The patient completed five months of targeted antibiotic therapy with Ciprofloxacin 750 mg every 12 hours and Cefuroxime 250 mg every 12 hours (Figure 6). Repeat bone scintigraphy did not demonstrate evidence of active infection.

One year later, the patient underwent reimplantation with a reverse total shoulder arthroplasty and cemented humeral stem. The procedure was uneventful (Figure 7). Postoperative rehabilitation was initiated at two weeks and continued for ten months. At the final follow-up, 18 months postoperatively, the wound was well-healed without signs of inflammation. The patient reported a Constant score of 43, and radiographs showed no evidence of loosening.

Figure 6. *Stage I Spacer post op*

Figure 7. *RSA – Stage II revion*

Discussion

This clinical case illustrates the complex challenges in managing PHFs complicated by periprosthetic infection. The patient sustained a Neer type II fracture with comminution of the tuberosities, which, based on Hertel's criteria, conferred a high risk of avascular necrosis.

Initial management with ORIF was chosen to preserve the native joint; however, it ultimately failed, likely due to the comminuted nature of the fracture and diminished metaphyseal bone stock. RSA was subsequently performed, which is commonly used in similar cases.

This case is notable due to the development of *Kocuria rosea* periprosthetic infection, a rare etiology in shoulder arthroplasty, with limited reports in the literature. This case highlights the challenges in managing *Kocuria rosea* infections, which may present with indolent symptoms and negative initial imaging, leading to delayed diagnosis and treatment.

Revision rates following RSA for failed ORIF range around 10%, with reported periprosthetic infection rates between 1% and 15%. The presented case highlights the importance of considering less common organisms in the setting of periprosthetic infection, particularly when initial cultures are negative.

Management of periprosthetic joint infection typically involves a two-stage revision, as performed in this case. The initial debridement, explantation, and antibiotic spacer placement aim to eradicate the infection.

The two-stage revision ultimately provided pain relief and improved function, allowing the patient to return to an acceptable quality of life. At the final follow-up, there was no evidence of recurrent infection.

Limitations of this case report include the single-patient experience and the lack of long-term follow-up beyond 18 months. Further research is needed to determine optimal management strategies for *Kocuria rosea* periprosthetic infections.

Conclusion

This case demonstrates the complexities associated with managing PHFs, particularly when complicated by periprosthetic infection with rare organisms such as *Kocuria rosea*. Early recognition of potential complications, a thorough diagnostic workup, and individualized treatment strategies are essential for optimizing patient outcomes.

Conflict of Interest

The authors declare no conflict of interest.

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