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Conservative management of chronic *Cutibacterium acnes* prosthetic shoulder infection: 2 case reports with minimum 6-year follow-up



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Prosthetic shoulder infection is a potentially devastating condition and is most commonly associated with *Cutibacterium acnes*. The reported prevalence of deep infection after shoulder arthroplasty ranges from 0.7% to 15.4%.^{3,10,11} Recommended treatment for prosthetic infection includes staged revision^{1,9} and resection.^{2,8} However, this decision can be difficult in the scenario of a patient who has a good clinical outcome given the significant potential morbidity of surgical treatment.

We present 2 cases of patients in whom *C. acnes* reverse prosthetic infection developed with recurrent abscess formation. The patients strongly preferred to proceed with conservative treatment consisting of antibiotics and periodic in-office drainage with wound packing.

Case report

Case 1

A 60-year-old male patient underwent a reverse total shoulder arthroplasty (Tornier, Bloomington, MN, USA) for an irreparable rotator cuff tear with clinical pseudoparalysis. He had a history of an os acromiale repair with concomitant rotator cuff repair performed by a different surgeon 1 year prior to undergoing shoulder arthroplasty. Acromial fracture union was achieved 3 months

postoperatively, as confirmed by a computed tomography scan, but the rotator cuff repair failed.

At 13 months after arthroplasty, the patient was doing well. At 18 months postoperatively, he presented to our clinic with an already granulated sinus tract. This was subsequently surgically explored. It was believed intraoperatively that the sinus did not communicate with the underlying prosthesis at that point, with 3 negative cultures held for an extended duration of 14 days; the patient was treated with a short course of antibiotics (owing to the assumption that this was only a superficial infection) and did well. He subsequently presented 24 months after arthroplasty with skin erythema from a subcutaneous abscess. He was taken to the operating room for surgical débridement with prosthetic retention (because he adamantly declined prosthesis removal) and wound vacuum-assisted closure (KCI, San Antonio, TX) placement. Cultures at that time were positive for *C. acnes*. The patient underwent wound vacuum-assisted closure therapy for assisted secondary-intention wound closure. He underwent definitive surgical wound closure 2 weeks later and completed a 6-week course of intravenous antibiotics. Oral antibiotics for suppression were offered, but the patient declined to continue taking antibiotics on his own.

The patient returned 40 months after his index arthroplasty procedure with another sealed sinus tract (Fig. 1, A); this occurred 1 month after he underwent abscess drainage performed by his primary physician in the office. The patient wanted to continue with conservative treatment as he had good functional outcome scores (Single Assessment Numeric Evaluation [SANE] score, 98; American Shoulder and Elbow Surgeons [ASES] score, 94; Constant score, 85; and Penn score, 85).

This study received approval from the Loma Linda Health Institution Review Board Human Protection Program (IRB No. 5180330).

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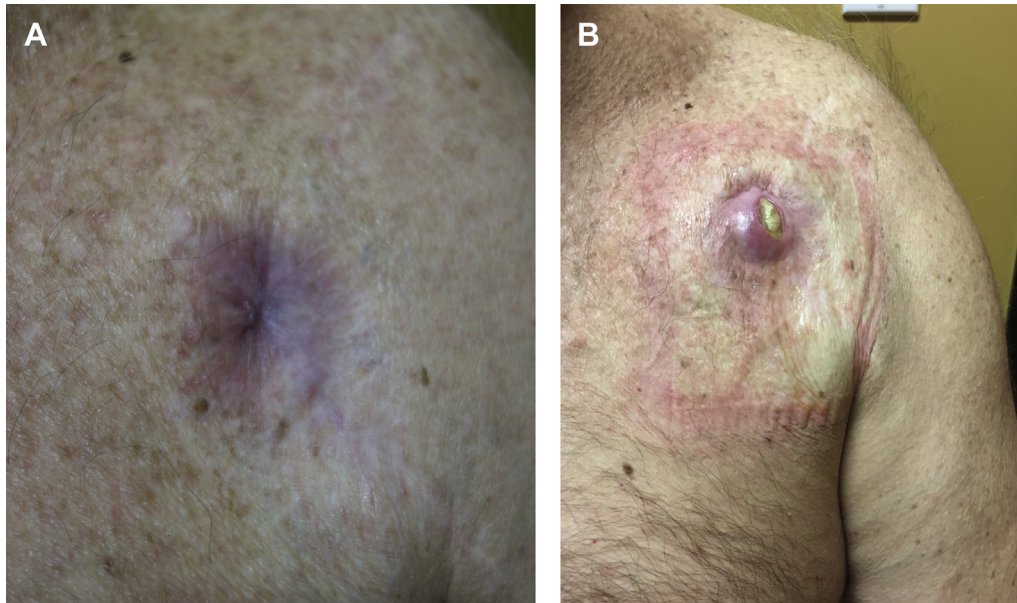


Figure 1 Clinical photograph showing sealed sinus tract at 40 months (A) and recurrent abscess formation at 48 months (B) after prosthetic implantation.

The patient returned again 4 years after his index arthroplasty procedure after the development of another abscess (Fig. 1, B) that was drained and packed in the office. He was seen again at 7 years with a chronic sinus tract. Radiographs taken at that time showed progressive proximal humeral and inferior glenoid osteolysis (Fig. 2). The patient reported intermittent drainage treated with periodic packing over the past 3 years. Regarding the functional outcome scores, the SANE score was 80, the ASES score was 86.7, the Constant score was 64.5, and the Penn score was 88, and he adamantly wanted to continue conservative treatment with wound care.

Case 2

A 79-year-old female patient with a history of urinary incontinence and polio underwent reverse total shoulder arthroplasty for rotator cuff tear arthropathy. She had an uncomplicated course and was doing well at the 2-year follow-up. She returned 46

months after surgery with a large skin abscess (Fig. 3, A) over the shoulder incision. She declined staged revision or other operative intervention; thus, drainage was performed in the office, and cultures were positive for *C. acnes*. She was then prescribed a 2-month course of oral doxycycline. The infectious disease team recommended the administration of long-term suppressive antibiotics; however, diarrhea developed and the patient declined further antibiotic care. Over the next few months, she reported intermittent drainage that resolved spontaneously. The wound eventually sealed spontaneously (Fig. 3, B) with persistent erythema. The patient did not want to undergo surgical débridement or resection arthroplasty. She was last seen 74 months after the index procedure with evidence of inferior glenoid osteolysis with a broken screw and proximal humeral osteolysis (Fig. 4). She was very pleased with her shoulder function, reported no pain, and declined any additional invasive treatment. The functional outcome scores were as follows: SANE score, 90; ASES score, 76; Constant score, 68; and Penn score, 81.5.

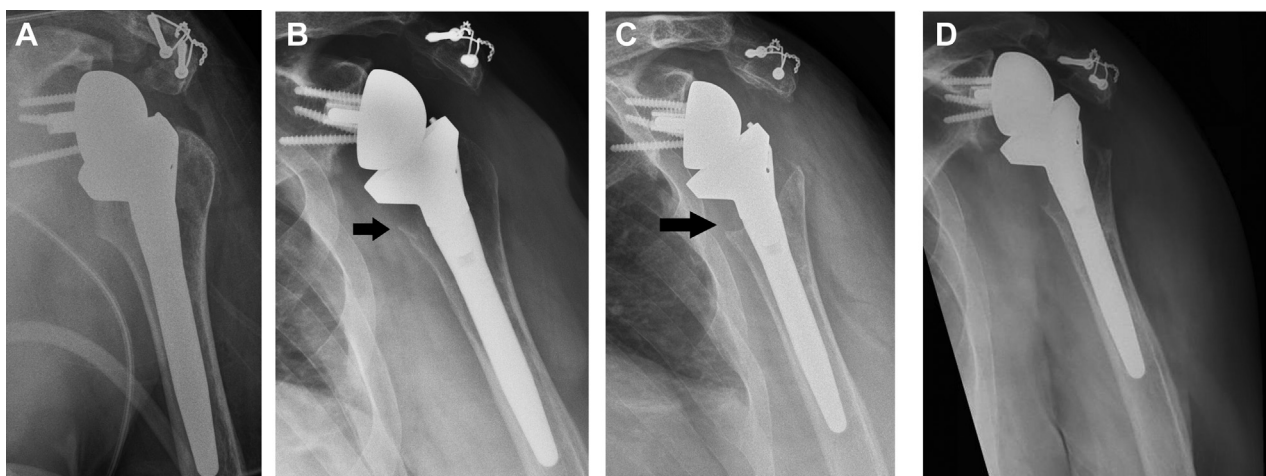


Figure 2 (A) Immediate postoperative anteroposterior (AP) radiograph. (B) A 2-year postoperative AP radiograph shows proximal humeral osteolysis (→). AP radiographs taken later, 51 months (C) and 7 years (D) after the index arthroplasty procedure, show increased bone loss (→) and evidence of hardware breakage.

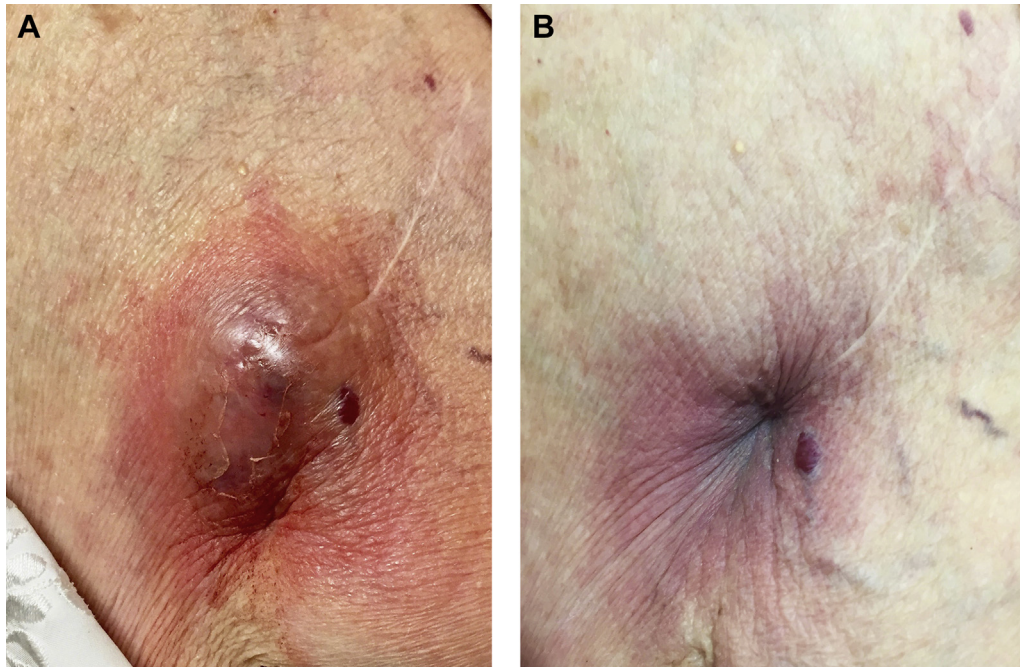


Figure 3 Clinical photographs showing a large skin abscess over the shoulder incision at 46 months postoperatively (A) that spontaneously sealed with overlying erythema a few months later (B).

Discussion

Given recurrent abscess formation and radiographic changes,^{4,7} it is clear that our 2 cases satisfied the criteria for a deep periprosthetic infection; however, despite declining staged revision surgery from the initial onset, both patients had good clinical outcomes with no functional deficits at final midterm follow-up (6–7 years) with local wound care.

We document these cases not to suggest that medical management is the preferred method of treating a prosthetic shoulder infection but to provide further insight on the natural history of *C acnes* periprosthetic infection. We explained to our patients and teach our residents that the traditional treatment for periprosthetic infection is exchange revision^{3,9} or definitive resection arthroplasty.^{2,8} Our standard workup for suspected periprosthetic shoulder infection includes baseline inflammatory markers, intraoperative frozen section, and cultures held for at least 14 days. In patients in whom there is a low preoperative and intraoperative suspicion for infection, intravenous antibiotics are discontinued at 24 hours and the patients are sent home while taking oral antibiotics until the results of the extendedly held intraoperative cultures are finalized. In patients in whom there is a high preoperative or intraoperative suspicion for infection, an exchange revision is performed with intravenous antibiotics continued for at least 3 weeks unless cultures are substantially positive, which may require a longer antibiotic regimen in consultation with our infectious disease colleagues depending on the offending pathogen.

However, the results of surgical treatment of an infected shoulder prosthesis remain guarded at best. George et al⁵ found average Constant scores between 31 and 51 for patients undergoing exchange arthroplasty, resection arthroplasty, or permanent spacer implant. Kim et al⁶ demonstrated that revision arthroplasty for

infection had the least functional improvements compared with other etiologies for revision. In our experience, we supported the patients' autonomy and opinion that in their particular cases, the treatment using staged revision or resection seemed worse than the problem itself.

There are certainly limitations to this report. Although we believe that a minimum 6-year follow-up period is adequate for a clinical outcome report, perhaps the low virulence of *C acnes* allows for conservative treatment to be satisfactory in the short term to midterm; however, this may not be enough time for a *C acnes* infection to completely express its full detrimental effect. It is reasonable to expect some further radiographic progression and eventual clinical decline with longer follow-up. The presence of osteolysis around the inferior baseplates in both patients, as well as the broken screw, suggests the possibility of eventual baseplate loosening and mechanical failure that may also require revision in the future. The operating surgeon has repeatedly counseled the patients that they may experience a sudden onset of severe pain and a subsequent marked decline in function due to catastrophic implant failure. We are also not suggesting that conservative treatment become the gold standard in the context of fulminant sepsis. In addition, besides the Constant score, the clinical outcome scores we used were primarily subjective by their very nature and may reflect particular characteristics of a patient who may not report complaints to avoid surgical treatment.

Conclusion

The traditional treatment for periprosthetic infection is staged revision or definitive resection. However, in some instances, patients may decide that the morbidity of surgical treatment may be worse than the clinical problem. Our 2 patients showed good



Figure 4 Anteroposterior radiograph of right shoulder 6 years after index procedure showing progressive proximal humeral and inferior glenoid osteolysis and screw breakage.

clinical outcomes at a minimum of 6 years' follow-up with conservative treatment of chronic prosthetic shoulder infections.

Disclaimer

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