

Acute infection with *Propionibacterium acnes* after a Latarjet coracoid transfer procedure: a case report

Brandon J. Erickson · Sanjeev Bhatia ·
Debdut Biswas · Nikhil N. Verma

Received: 22 March 2014 / Accepted: 27 August 2014
© European Society of Sports Traumatology, Knee Surgery, Arthroscopy (ESSKA) 2014

Abstract Coracoid transfer procedures are highly effective at improving glenohumeral stability in patients with recurrent shoulder instability; complication rates from this procedure are generally low. We present the first case in the literature of a *Propionibacterium acnes* (*P. acnes*) infection following a coracoid transfer. The case stresses the importance of proper antibiotic prophylaxis for patients undergoing Latarjet procedures, as well as the workup for a painful postoperative shoulder, and the need to maintain cultures from the shoulder for up to 21 days to isolate *P. acnes*.

Level of evidence V.

Keywords Shoulder · Latarjet · *Propionibacterium acnes* · Arthroscopy · Infection · Instability · Bankart

Introduction

Coracoid transfer procedures are highly effective at improving glenohumeral stability in patients with recurrent shoulder instability [1, 2, 12, 16]. During the procedure, the coracoid, along with the conjoint tendon, are shifted onto the anteroinferior aspect of the glenoid in order to reconstitute the static and dynamic restraints of the glenohumeral joint [12]. Although the procedure is effective at improving glenohumeral stability, complications do sometimes occur in a small minority of patients [15, 16].

Infection after shoulder surgery can be a devastating complication that often requires both a vigorous debridement in the operating room (OR) as well as several weeks of intravenous antibiotics. Fortunately, the incidence of infection after shoulder surgery is relatively low [16].

Most cases of infection following shoulder surgery are caused by the bacterial species *Staphylococcus aureus* and coagulase-negative *Staphylococcus*. Infections with these agents typically present acutely (less than 3 months after surgery) [5]. *Propionibacterium acnes* (*P. acnes*) is a gram-positive, anaerobic bacillus found natively on cutaneous surfaces that traditionally is nonpathogenic but has recently been implicated as a rare cause of orthopedic infections [5–7, 10].

Shoulder infections with *P. acnes* are generally reported to be chronic, indolent infections, usually manifesting as persistent pain [7] or in a very delayed fashion, often years after the index surgery [5]. Here, we present the first reported case in the literature of an acute infection with *P. acnes* following a Latarjet glenohumeral reconstruction.

Case

A 22-year-old right-hand dominant male presented to our clinic with complaints of recurrent left shoulder instability for 4 years. He sustained a basketball injury, but did not frankly dislocate, and at no point over the past 4 years had to be reduced by a physician. He constantly felt as if his shoulder was going to dislocate anteriorly and stated he was unable to perform his activities of daily living without subjective feelings of instability accompanied by pain. He was unable to sleep on his left shoulder, had never had surgery on either shoulder, and had undergone a course of physical therapy after the initial injury without benefit. He

B. J. Erickson (✉) · S. Bhatia · D. Biswas · N. N. Verma
Division of Sports Medicine, Midwest Orthopaedics at Rush,
Rush University Medical Center, 1611 W Harrison St Suite 300,
Chicago, IL 60611, USA
e-mail: berickso.24@gmail.com

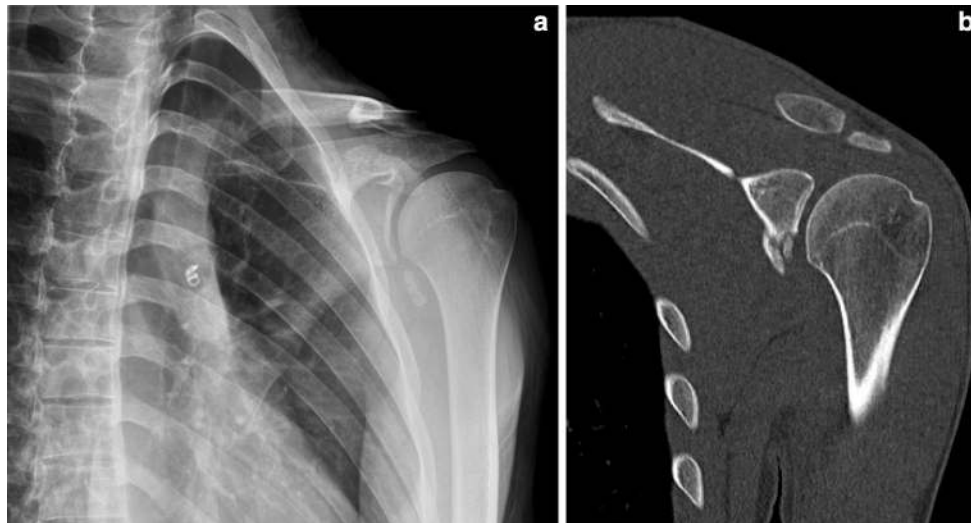


Fig. 1 Preoperative anteroposterior, **a** radiograph and coronal, **b** CT images of the left shoulder demonstrating a bony Bankart lesion with a fragment of bone in the axilla as well as glenoid bone loss involving 25 % of the glenoid surface, a Hill-Sachs lesion, and an inferior loose body

had not seen an orthopedist for the past 3 years and had simply been dealing with the shoulder instability. He was allergic to cephalosporins. Physical exam was remarkable for painless active forward elevation to 170°, abduction to 170°, external rotation to 50°, and internal rotation to T12 with 5/5 strength. He had a positive apprehension and relocation test, but no sulcus sign was present.

Radiographs and computed tomography (CT) scans revealed a bony Bankart injury with a bone fragment anteriorly as well as evidence of anterior glenoid bone loss (Fig. 1a, b). The patient was counseled on the operative and non-operative options and chose to undergo an arthroscopic, possible open bony Bankart repair vs. Latarjet.

After receiving 900 mg of intravenous Clindamycin prior to making the skin incision, the patient underwent an initial diagnostic arthroscopy at which time it was determined that the bone fragment was of insufficient quality for repair. The portals were closed, a temporary dressing was applied, the patient was changed from lateral decubitus to beach chair position, and a repeat prep and drape were performed. An uncomplicated Latarjet procedure was performed and he was discharged.

He was presented to our Emergency Department on postoperative day (POD) nine with fevers, chills, and pain in the left shoulder. On exam, he had minimal pain with short arc range of motion of the shoulder and was neurovascularly intact. Labs were drawn that demonstrated a white blood cell (WBC) count of 9.35, an erythrocyte sedimentation rate of 36, and a c-reactive protein of 107.8. His shoulder was aspirated under sterile conditions by the attending surgeon who performed the Latarjet. This aspiration demonstrated a WBC count of 19,000 with 91 % segmental neutrophils and a negative gram stain. Given his

young age and the concern for infection, the decision was made to take the patient to the OR for an open irrigation and debridement.

The patient had received a dose of Vancomycin in the emergency department, but preoperative antibiotics were held for intra-operative cultures, which showed a WBC count 43,000 with 88 % segmental neutrophils and had a negative gram stain. Tissue cultures were sent. The shoulder was copiously irrigated and debrided. He was admitted to the orthopedic service with an infectious disease consult. Intravenous Vancomycin was begun with plans to continue this for 2 weeks and transition to oral doxycycline for 6 weeks, totaling 2 months of antibiotics. His cultures remained negative, and he was discharged on POD four. On POD five, his intra-operative cultures grew *P. acnes*. He completed his detailed antibiotic regimen, and at his last clinic follow-up was doing well. He had a full range of motion in his shoulder and had no complaints, and radiographs showed well-fixed hardware (Fig. 2).

Discussion

Although rare, infections following shoulder surgery can be dreadful, especially if accompanied by a delay in diagnosis and treatment [16]. Although *P. acnes* has been implicated in many shoulder arthroplasty infections, this case is the first in the literature to document an acute postoperative infection of a Latarjet procedure with *P. acnes* [11]. As mentioned, *P. acnes* is a gram-positive, traditionally nonpathogenic, anaerobic bacillus found natively on cutaneous surfaces [6, 7, 10]. Although the most common bacteria isolated from the skin surrounding the shoulder is



Fig. 2 Postoperative anteroposterior radiograph of the left shoulder demonstrating a well-positioned bone block without the evidence of hardware migration or failure

coagulase-negative staphylococcus, *P. acnes* has recently become more studied [4, 10, 14]. Pottinger examined revision shoulder arthroplasties for stiffness, pain, or loosening, and found 70 % of the patients with positive cultures showed growth of *P. acnes* [11]. Therefore, shoulder surgeons should aim to minimize risk of *P. acnes* infections as well as rapidly diagnose and treat all infections.

Despite an incidence of less than 2 %, postoperative shoulder infections from a Latarjet are devastating complications [3]. Studies have shown *P. acnes* is more prevalent in the skin surrounding the shoulder when compared to the hip or knee and is seen more frequently in men than women [10]. Therefore, high-risk patients (men undergoing shoulder surgery) should receive effective preoperative prophylaxis specifically covering *P. acnes*. Level one evidence has shown that 2 % chlorhexidine gluconate-impregnated cloths, used preoperatively by patients at home to clean the skin prior to surgery, eliminate the bacterial load of *P. acnes* better than soap and water, although may not decrease infection rates [8]. Furthermore, there is no statistically significant difference in efficacy between ChlorPrep, DuraPrep, and povidone-iodine scrub in eliminating *P. acnes* from the shoulder region in the pre-surgical scrub [14].

As surgical antibiotic prophylaxis is one of the most important steps in preventing infection, Crane et al. [4] recently reviewed the virulence and resistance of several strains *P. acnes* to common antibiotics. This study found

that both penicillins and cephalosporins were effective against *P. acnes*, but there were many strains of *P. acnes* that were highly resistant to clindamycin. Shoulder surgeons who routinely used antibiotic prophylaxis have a lower infection rate than those who did not [13]. However, surgical antibiotic prophylaxis is likely leading to an increasing number of resistant strains of bacteria, and although infection rates are likely decreased overall with the use of prophylactic antibiotics, more resistant strains of bacteria are coming to light that may cause serious problems in the future [9].

The sensitivities and exact strain of *P. acnes* that caused the infection in our patient are unknown, as it is not routine practice in the lab at our institution to perform sensitivity analysis on anaerobic cultures. However, it may be prudent to ensure patients undergoing shoulder surgery who are allergic to penicillins/cephalosporins receive a separate preoperative antibiotic in addition to or in place of clindamycin to cover these resistant strains. Based on the Crane et al. [4] study, Moxifloxacin or Ertapenem would be effective for these patients. Unlike many organisms, the clinical findings in a shoulder infected with *P. acnes* may be subtle (ESR and CRP can be normal, pain with shoulder motion may not be as extreme), and cultures will not turn positive until an average of 9 days, with the possibility of taking up to 3 weeks [5–7].

Finally, in many cases of arthroscopic stabilization, patients are positioned in the lateral decubitus position for surgery. However, in cases of open Latarjet, positioning is generally beach chair. In cases in which an initial diagnostic arthroscopy is converted to open Latarjet, the transfer of the patient from lateral to beach chair after initial portals have been established is required. This situation may pose an additional risk for contamination of the surgical field and caution should be taken to insure adequate dressing application and repeat prep and drape after the initial surgical procedure.

References

1. Bhatia S, Ghodadra NS, Romeo AA, Bach BR, Verma NN, Vo ST, Provencher MT (2011) The importance of the recognition and treatment of glenoid bone loss in an athletic population. *Sports Health* 3(5):435–440
2. Bhatia S, Van Thiel GS, Gupta D, Ghodadra N, Cole BJ, Bach BR Jr, Shewman E, Wang VM, Romeo AA, Verma NN, Provencher MT (2013) Comparison of glenohumeral contact pressures and contact areas after glenoid reconstruction with Latarjet or distal tibial osteochondral allografts. *Am J Sports Med* 41(8):1900–1908
3. Butt U, Charalambous CP (2012) Complications associated with open coracoid transfer procedures for shoulder instability. *J Shoulder Elbow Surg* 21(8):1110–1119
4. Crane JK, Hohman DW, Nodzo SR, Duquin TR (2013) Antimicrobial susceptibility of *Propionibacterium acnes*

- isolates from shoulder surgery. *Antimicrob Agents Chemother* 57(7):3424–3426
5. Dodson CC, Craig EV, Cordasco FA, Dines DM, Dines JS, Dicarlo E, Brause BD, Warren RF (2010) *Propionibacterium acnes* infection after shoulder arthroplasty: a diagnostic challenge. *J Shoulder Elbow Surg* 19(2):303–307. doi:10.1016/j.jse.2009.07.065
 6. Matsen FA 3rd, Butler-Wu S, Carofino BC, Jette JL, Bertelsen A, Bumgarner R (2013) Origin of propionibacterium in surgical wounds and evidence-based approach for culturing propionibacterium from surgical sites. *J Bone Joint Surg Am* 95(23):e1811–1817
 7. Millett PJ, Yen YM, Price CS, Horan MP, van der Meijden OA, Elser F (2011) *Propionibacterium acnes* infection as an occult cause of postoperative shoulder pain: a case series. *Clin Orthop Relat Res* 469(10):2824–2830
 8. Murray MR, Saltzman MD, Gryzlo SM, Terry MA, Woodward CC, Nuber GW (2011) Efficacy of preoperative home use of 2 % chlorhexidine gluconate cloth before shoulder surgery. *J Shoulder Elbow Surg* 20(6):928–933
 9. Norton TD, Skeete F, Dubrovskaya Y, Phillips MS, Bosco JD 3rd, Mehta SA (2014) Orthopedic surgical site infections: analysis of causative bacteria and implications for antibiotic stewardship. *Am J Orthop* 43(5):E89–92
 10. Patel A, Calfee RP, Plante M, Fischer SA, Green A (2009) *Propionibacterium acnes* colonization of the human shoulder. *J Shoulder Elbow Surg* 18(6):897–902
 11. Pottinger P, Butler-Wu S, Neradilek MB, Merritt A, Bertelsen A, Jette JL, Warme WJ, Matsen FA 3rd (2012) Prognostic factors for bacterial cultures positive for *Propionibacterium acnes* and other organisms in a large series of revision shoulder arthroplasties performed for stiffness, pain, or loosening. *J Bone Joint Surg Am* 94(22):2075–2083
 12. Provencher MT, Bhatia S, Ghodadra NS, Grumet RC, Bach BR Jr, Dewing CB, LeClere L, Romeo AA (2010) Recurrent shoulder instability: current concepts for evaluation and management of glenoid bone loss. *J Bone Joint Surg Am* 92(Suppl 2):133–151
 13. Randelli P, Castagna A, Cabitza F, Cabitza P, Arrigoni P, Denti M (2010) Infectious and thromboembolic complications of arthroscopic shoulder surgery. *J Shoulder Elbow Surg* 19(1):97–101
 14. Saltzman MD, Nuber GW, Gryzlo SM, Marecek GS, Koh JL (2009) Efficacy of surgical preparation solutions in shoulder surgery. *J Bone Joint Surg Am* 91(8):1949–1953
 15. Schmid SL, Farshad M, Catanzaro S, Gerber C (2012) The Latarjet procedure for the treatment of recurrence of anterior instability of the shoulder after operative repair: a retrospective case series of forty-nine consecutive patients. *J Bone Joint Surg Am* 94(11):e75
 16. Shah AA, Butler RB, Romanowski J, Goel D, Karadagli D, Warner JJ (2012) Short-term complications of the Latarjet procedure. *J Bone Joint Surg Am* 94(6):495–501