

Mycobacterium tuberculosis infection of a reverse total shoulder arthroplasty: a case report

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We describe the case of a 78-years-old male with dyspnea, inappetence and weight loss over a period of two weeks. The CT scan suggested disseminated tuberculosis and T5-T6 spondylodiscitis. During hospitalization, he developed a left shoulder pain where a reverse total shoulder arthroplasty was implanted 11 years ago.

Open debridement and lavage with retention of the implant was performed first and intravenous antibiotics were administered. 3 months after surgery the patient developed a painful sinus track at the incision site. Resection of the fistula tract, soft tissue debridement and removal of the implants were performed before restarting chemotherapy.

As the incidence of reverse total shoulder arthroplasty continues to increase throughout the world, periprosthetic joint infection (PJI) will probably raise as well. Diagnosing and treatment of shoulder PJI with atypical germs remains a challenge and explantation seems to be the safer surgical option to avoid recurrent surgeries on patient with increasing comorbidities.

Keywords : Prosthetic Joint Infection, Periprosthetic Shoulder infection, tuberculosis, reverse shoulder arthroplasty, rTSA.

INTRODUCTION

Periprosthetic joint infection is a rare but dreadful complication after shoulder arthroplasty. Reports of periprosthetic joint infection's (PJI) incidence range from 1,1% to 3,8% following shoulder arthroplasty¹. The most common organisms are Staphylococci and Cutibacterium acnes. Infection of shoulder joint replacement with mycobacterium tuberculosis is much less common with only a handful of cases reported in the literature²⁻⁴. Lack of clinical suspicion and common co-infection often lead to a delay in diagnosis⁵. Considering the scarcity of studies and clinical reports to date, the optimal strategy for the management of shoulder arthroplasty mycobacterium tuberculosis PJI remains controversial. Especially, whether the implants needs to be removed is unclear. We report the case of a reverse shoulder arthroplasty TB-PJI in a caucasian patient with no history of travel and a distant exposure to M. tuberculosis at work 20 years ago. This case highlights the difficulty of diagnosis and treatment in such a case.

MATERIALS AND METHOD

A 78-year-old male with a history of type 2 diabetes underwent a cemented left reverse shoulder arthroplasty 11 years ago for primary osteoarthritis. The patient self-presented to the emergency department with dyspnea, inappetence, weight loss and night chills over 3 weeks. He had no history of recent or ancient travel and denied any cough. The patient C reactive protein (CRP) was 62.9mg/L and leucocyte count was 6600/mm³. CT scan revealed multiple nodules in the lungs. Urine samples and intradermic reaction test to tuberculin were negative for mycobacterium tuberculosis.

He underwent fibroscopy and bronchoalveolar lavage (BAL). PCR of BAL product and urine analysis were both weakly positive for mycobacterium tuberculosis. Interferon gamma release assay test was positive, suggestive of previous quiescent tubercular infection. PET CT demonstrated an increased metabolic activity around the shoulder prosthesis and showed signs of T5-T6 spondylodiscitis, despite no back pain reported by the patient. Debridement, lavage, and implant retention (DAIR) of the left shoulder was performed, and combination chemotherapy with ethambutol,

isoniazid, rifampicin and pyrazinamide was started immediately. PCR of the synovial samples were positive for mycobacterium tuberculosis.

Three months later, the patient returned to our clinic with a painful abscess with a mucoid discharge over the lower extremity of the incision (Figure 1). Laboratory results revealed a rising CRP at 22mg/L and 5000 leucocytes/mm³. Plain radiographs showed a well seated implant with no sign of loosening of the implant or osteolysis (Figure 2). Based on this finding and the history of MT infection, and the failure of our first strategy, resection arthroplasty was decided after multidisciplinary council.

RESULTS

Surgical explantation was performed and deep culture specimens were obtained. Explantation of the glenoid baseplate was especially challenging as the components did not demonstrate any sign of loosening. Post-operative bone loss was significant (Figures 3,4 and 5). Sample cultures revealed a co-infection with *C. Acnes*, and PCR for mycobacterium tuberculosis was positive after 8 weeks. The wound healed well and there was no discharge at one and two months after surgery. Quadritherapy was not well tolerated and was only given for 4 months, he continued with bitherapy for another 3 months. At 6 months post operative the wound's appearance was unremarkable and the patient was able to conduct his daily activities with a measured active abduction of 65°.



Fig. 1 — clinical image of the fistula at 3 months post DAIR.



Fig. 2 — X-ray showing a well fixed cemented rTSA.

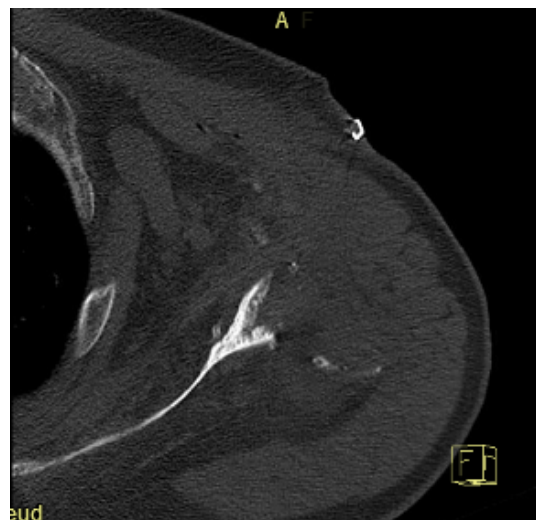


Fig. 3 — Axial CT showing glenoid loss after explantation.

DISCUSSION

With recent increase in the incidence of tuberculosis in western countries and the increase in rTSA, TB-periprosthetic shoulder infection is likely to become more common⁶.

Diagnosis of TB-PJI remains a challenge, especially in the shoulder joint where symptoms are commonly less typical. The lack of reliable serum laboratory markers, CRP or elevated leucocytes can be aspecific, intradermic reaction test to tuberculin



Fig. 4 — AP Xray of left shoulder showing glenoid bone loss.



Fig. 5 — glenoid component after explantation (with bone attached to the implant).

results can be inconclusive. Osteoarticular tuberculosis originates from hematogenous seeding of mycobacteria from the primary pulmonary lesion to where blood supply is best. Active disease can arise from latent tuberculosis years later. One could wonder why the infection appeared in the shoulder joint and not, in larger, weight bearing joints (80% of cases)⁷. One hypothesis could be the trajectory and proximity of the MT from the pulmonary ganglions to the axillar region but further studies have to prove this because joints are rarely involved by direct seeding but rather as a consequence of adjacent tuberculous osteomyelitis .

Imaging studies are useful but no sign is pathognomonic for osteoarticular tuberculosis. The radiological signs include narrowing of the joint space, subchondral erosions, cysts, and osteopenia wich are all different to interpret when the patient has an arthroplasty. MRI can be useful as well showing inflamatory changes in bone or osteonecrosis. In our case, with the presence of the implant and the risk of artefacts, PET CT was preferred.

As pointed out by Veloci et al. conservative treatment should be preferred out of the four treatment options the surgeon has⁸. DAIR can be the first line of treatment in acute (4 weeks or less) cases without loosening so deeper tissue samples can be harvested. The treatment algorithm of PJI suggest the exchange of modular components as well.

Concomitant infection rate is high in revision surgery, microscopy and culture of tissue sample is the gold standard. Multiple tissue and fluid biopsies were sent for cytology (2 fluid samples) and bacteriology (4 different tissue sample) on the second operation; these were sent to reference center laboratories. Incubation period lasts for a minimum of 21 days. Even if *C. Acnes* was found in the early days of incubation, the cultures were continued and revealed MT as co-infection. Surgery is not a substitution for a prolonged course of antituberculous therapy. The recommendations and guidelines give the surgeon a wide range of options; we think these patients should be discussed in a multidisciplinary fashion because untreated infection may extend to adjacent soft tissue to form cold abscesses with or without draining sinuses. Both these clinical signs are strongly suggestive of tuberculosis, although superinfection of sinuses may obscure the diagnosis. This exudative reaction is composed of serum leukocytes, caseous material, bone debris, and tubercle bacilli. The abscess penetrates the periosteum and migrates in various directions with persistent pain, a sinus tract and elevation of the inflammatory markers, non operative management was considered a failure and it was decided to perform a resection arthroplasty. Even if literature suggests that a majority of ulcers and sinuses can heal within 6 to 12 weeks with antituberculous therapy.

Resection arthroplasty has shown good clinical results in comparison with one or two stage revision. Spacer implantation was not chosen in our patient due to the risk of dislocation. In the literature review by Weber et al., in the largest serie of 51 resection arthroplasties, abduction and external rotation were acceptable (62° abd and 27° ER) wich corresponds to our case.

Our patient received a total of 7 months of antituberculous therapy (3 months after DAIR and 4 months after explantation). Recommended treatment duration is 6–9 months for drug-sensitive disease. Surgery is useful for abscess drainage, decompression and for joint reconstruction.

Reconstruction options are one-stage or two-stage reimplantation bone grafting with or without glenoid implantation, customize implants, chronic suppressive therapy, arthrodesis or amputation but this comes outside of the subject of this paper.

Unfortunately, no pre-operative scores (Constant, WOOS, ASES) were available with this patient so we did not perform score on the time of diagnosis of PJI. As pointed out by Trappey et al. stability and infection are related and could be one more argument for an infection in follow-up of a rTSA.

CONCLUSION

Finding the optimal surgical treatment in rare infections remains a challenge. Open discussion between orthopaedic surgeon, patient and infectiologist remains the most important asset in order to keep the risk and comorbidities as low as possible. Surgical treatment is nowadays not consensual. The global experience in shoulder arthroplasty infection remains lower than hip or knee arthroplasty and with the aging population and improvement in implant rTSA designs, shoulder surgeons will be more and more exposed to this problematic.

Even if the patient was considered elderly on a medical point of view, he was active, resection arthroplasty was well tolerated and was a good compromise between less invasive and conservative management. Revision arthroplasty with or without reconstruction of his glenoid is kept as the next option if the patient is demanding in the future.

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