



Treatment of Periprosthetic Tuberculous Infection of Total Hip Arthroplasty with Long Term Medication without Implant Removal

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Periprosthetic joint infection is one of the most dreaded complications of replacement arthroplasty and the incidence of periprosthetic tuberculous infections is increasing. This report presents a case of extensive periprosthetic tuberculous infections of primary total hip arthroplasty which was treated with debridement and long periods of antituberculous medication without implant removal. The patient completed 18 months of 4 drug antituberculous chemotherapy and the plain radiograph on the last review showed new bony consolidation around the prosthesis without loosening or signs of reactivation.

Key Words: Periprosthetic tuberculous infection, Total hip arthroplasty, Antituberculous medication, Without implant removal

Tuberculosis (TB) infection is in a rising trend in the developed world because of compromised immune system by immunosuppressive drugs, substance abuse, or AIDS and as the result of immigrants from endemic countries. With this current trend, orthopaedic surgeons are increasingly likely to encounter patients affected with this disease¹⁾. There have been reports²⁾ of total hip arthroplasty (THA) following TB infection and now,

there is a rise in reports in patients with periprosthetic TB infection with no previous evidence of TB exposure^{1,3-7)}. As we are aware that diagnosis in TB periprosthetic joint or any TB joint is difficult and a misdiagnosis is common^{1,7)}. Furthermore, in the presence of total joint prosthesis, TB reactivation is even more difficult to diagnose, because radiographs, erythrocyte sedimentation rate (ESR) and bone scanning are of limited value⁵⁾. However, in TB periprosthetic infection early detection and adequate treatment is essential to avoid revisional arthroplasty⁷⁾. Similarly, Kreder and Davey⁵⁾ concluded even though periprosthetic TB infection is uncommon; it can be managed well if the diagnosis is achieved early and treated correctly.

Now we report a case of extensive periprosthetic TB infection of primary THA which was treated without implant removal. The patient and his family members gave their consent for publication of the case details.

Submitted: May 30, 2013 **1st revision:** August 6, 2013
2nd revision: August 23, 2013 **3rd revision:** September 4, 2013
Final acceptance: September 8, 2013

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Case Report

A 64 years old man who presented in November 2004 complaining of right groin and hip pain related to activity. He gave history of bilateral primary THA (DePuy, Cup: Duraloc, Stem: AML, Liner: Duraloc polyethylene liner) of both the femoral head in 1992 for presumed avascular necrosis of femoral head. At no time there has been any sinus or signs of infection. He was well for 12 years but started to have right groin and hip pain for 1 month. The pain was progressive in nature till, he was restricted to using a walking stick and essential confirmed to his house. His general health was good as he did not give any history of previous contact with TB and no other medical history, no trauma nor other constitutional symptoms.

On physical exams, he could not walk without a walking stick. There was a limited range of motion of right hip due to pain and wasting of right quadriceps muscle mass was observed. He had no signs of inflammation nor sinus discharge around the right hip. The plain radiograph revealed periprosthetic bony destruction but the implants were intact with no displacement or loosening (Fig. 1). The routine ESR was 90 mm in the 1st hour, C-reactive protein (CRP) was 2.5 mg/dl and total white blood cell (WBC) count was 10,000/mm³. The chest radiograph was clear with no signs of TB and the tuberculin test was negative. The sputum and urine sample was sent to look for other sites of TB infection, but was negative.

Subsequently, he underwent debridement and curettage

for his periprosthetic hip infection. Intraoperatively, there was no obvious pus or slough but the synovium was inflamed and synovial fluid was brownish in color and there was bony destruction around the right proximal femur. Thorough debridement of all infected tissue including implant removal seemed to be very difficult because prosthetic implants were stable and well fixed, so it was decided not to do an extensive debridement and to retain the implants. Based on histopathological exams of the debrided sample, the diagnosis of TB was confirmed when the synovial tissue biopsy showed chronic inflammatory caseating granuloma and Antituberculous medication (ATM) was started at third day of the debridement. He was treated daily with the following oral ATM: isoniazid(5 mg/kg), rifampicin (10 mg/kg), ethambutol(15 mg/kg) and pyrazinamide (20 mg/kg) for 18 months.

The patient showed remarkable clinical and laboratory recovery, whereby the right hip pain was no more a hindrance for him to walk without a walking aid and the blood parameters for infection was on down trend, CRP was below 0.3 mg/dL and ESR below 20 mm/hr for 6 consecutive months after 12 months of ATM (Fig. 2). Currently, he is still on our outpatient follow-up of seven years and he had completed 18 months of ATM. On the 8 years follow-up, the radiograph showed bony consolidation without loosening of the prosthesis (Fig. 1) and his CRP level was below 0.3 mg/dL and ESR below 20 mm/hr.

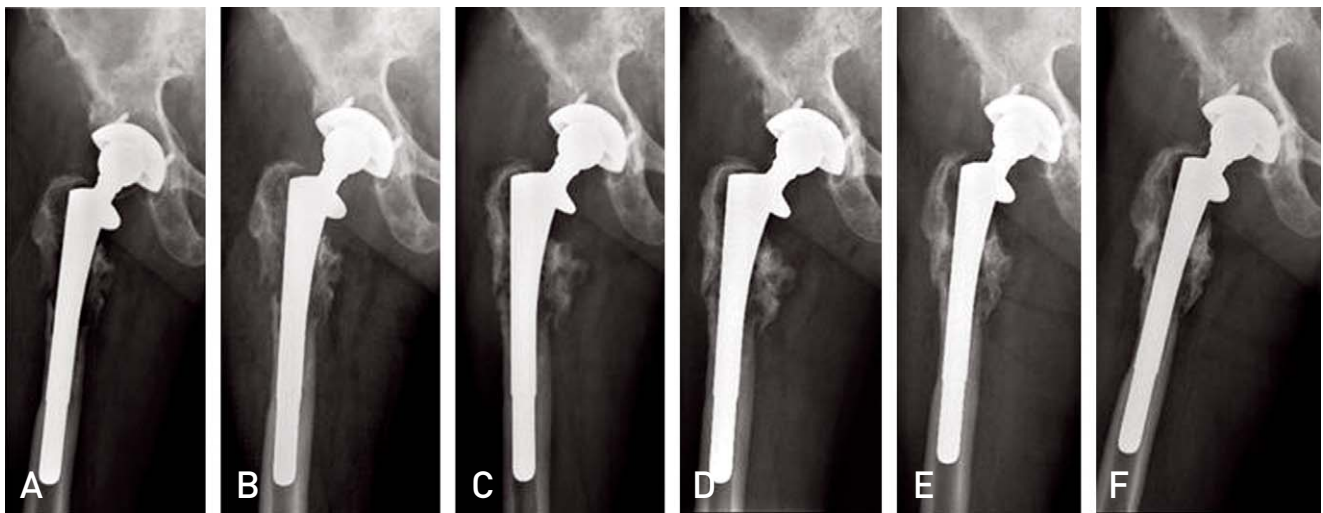


Fig. 1. Anteroposterior view of right hip showing the progress of periprosthetic TB infection. (A) After debridement, (B) one year, (C) two year, (D) three year, (E) five year, (F) seven year follow-up.

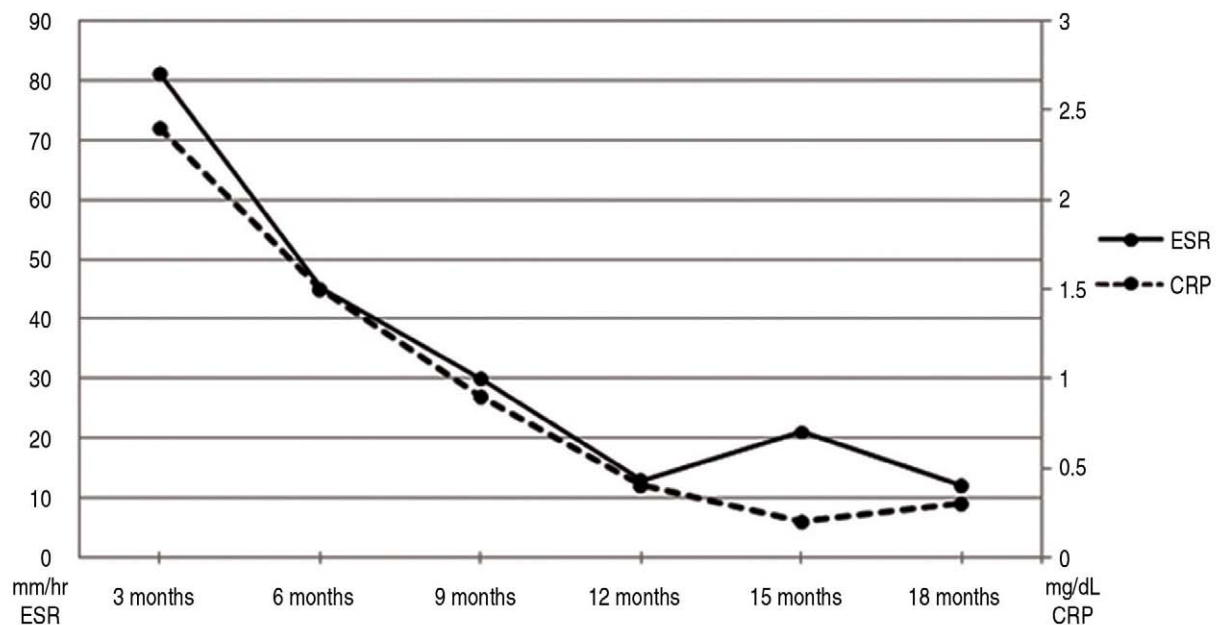


Fig. 2. Graph showing the progress of the ESR and CRP. The last 6 months of ATM, the ESR and CRP was within normal range.

Table 1. Literature Review of Periprosthetic TB Infection without Previous History of TB

| Author and Year | Joint | Time Elapsed | Medication & Duration In (Months) | Treatment/Surgery | Follow-up |
|--------------------------------------|-------|--------------|-----------------------------------|---|------------|
| McCullough ^[8] 1977 | Hip | 7.8 Years | S(2),I,R(18) | Debridement | 6 Months |
| Zeiger et al. ^[11] 1984 | Knee | 4 Years | NS | Resection Arthroplasty | NS |
| Wolfgang ^[12] 1985 | Knee | 1 Year | I,R(24) | Reinsertion | 12 Months |
| Levin ^[13] 1985 | Hip | 4 Years | S(3.5),I,R(36) | Resection Arthroplasty | 2.5 Months |
| Baldini et al. ^[3] 1988 | Hip | 1.7 Years | NS | Resection Arthroplasty | 4 Months |
| Ueng et al. ^[14] 1995 | Hip | 1.5 Years | I,R,E(24) | Staged Exchange | 3 Years |
| Ueng et al. ^[14] 1995 | Hip | 14 Years | I,R,E(12) | Resection Arthroplasty | 2 Years |
| Tokumoto et al. ^[15] 1995 | Knee | 1.7 Years | I,E(18) | Debridement | 8 Years |
| Tokumoto et al. ^[15] 1995 | Hip | 38 Years | I,R(12) | Arthrodesis | 2 Years |
| Lusk et al. ^[16] 1995 | Knee | 15 Years | I,E,P(6) | Resection Arthroplasty | 6 Months |
| Spinner et al. ^[17] 1996 | Knee | 6 Years | I,E,P(9) | Debridement | 2.5 Years |
| Kreder and davey ^[5] 1996 | Hip | 4 Years | I,E,P(9) | Acetabulum Revision | 18 Months |
| Berbari et al. ^[18] 1998 | Hip | 10 Years | I,R(15) | Staged Exchange | 7 Years |
| Berbari et al. ^[18] 1998 | Hip | 23 Years | I,E(16) | Resection Arthroplasty | 8 Years |
| Berbari et al. ^[18] 1998 | Hip | 30 Years | R(1),I,E(19) | Resection Arthroplasty | 10 Years |
| Boéri et al. ^[4] 2003 | Hip | 2 Years | I,R(17),I,E,P(4) | No Surgery for One Case Revision Arthroplasty for One Case | 6 Years |
| Marmor et al. ^[1] 2004 | Knee | 4 Months | I,E,P(8) | Debridement | 18 Months |
| Marmor et al. ^[1] 2004 | Knee | 2 Months | I,R,P(6) | Revision Arthroplasty | 5 Years |
| Marmor et al. ^[1] 2004 | Knee | 3 Months | I,R,P(6) | Revision Arthroplasty | 7 Years |
| Kaya et al. ^[19] 2006 | Hip | 9 Years | I,E,P (NS) | Resection Arthroplasty | NS |
| Khater et al. ^[9] 2007 | Knee | 3 Months | I,E(18),R,P(NS) | Resection Arthroplasty | NS |
| Shanbhag et al. ^[20] 2007 | Hip | 15 Months | R,E,P(12) | Debridement | 18 Months |
| Lee et al. ^[21] 2009 | Knee | 2 Months | R,E(12) | Debridement | 13 Months |
| Neogi et al. ^[7] 2009 | Knee | 14 Years | I,R(12),E,P(4) | Medication Only | 3 Years |
| This case | Hip | 12 Years | R,I,E,P(18) | Debridement | 8 Years |

E: ethambutol, I: isoniazid, P: pyrazinamide, R: rifampicin, S: streptomycin, NS: not specified.

Discussion

Prosthetic joint infection due to TB is increasing in trend in our clinical practice. Till today, there are 24 cases reported of TB periprosthetic joint infection without history of pulmonary or extra-pulmonary tuberculosis^{1,3-5,7-9)} (Table 1). In 1977 McCullough⁸⁾ was the first to report a case of TB infection that followed THA 7 years later without prior history of TB infection. Baldini et al.³⁾ reported a case of early failure of THA 21 months after surgery because of TB and it was during removal of prosthesis that diagnosis of TB was made.

Methods of treatment for tuberculous periprosthetic infection varies from debridement without removal of well-fixed implants to resectional arthroplasty depending on surgeons and condition of hip joint. Besser⁶⁾ reported TB infection of total knee arthroplasty (TKA) in unsuspected patient. He retained the prosthesis and started ATM based on clinical suspicion of TB which was confirmed by synovial biopsy. Boéri et al.⁴⁾ in 2003 retained THA prosthesis in TB infection where the prosthesis was stable, well fixed and there was insufficient bone stock. This case is the only report after Boéri et al.⁴⁾ that a TB periprosthetic implant was retained due to insufficient bone stock and the prosthesis was well fixed. However, Marmor¹⁾ reported favorable outcomes with and without removal of the prosthesis with ATM. He retained TKA prosthesis when the infection is recognized early in one case and 2 staged revision TKA for the other two cases which was recognized late.

In this case, the infection was unexpected; a high index of suspicion of TB was always in our mind. Kreder and Davey⁵⁾ concluded that when dealing with unexpected arthroplasty failure, the suspicion of TB is necessary. In this case, the TB periprosthetic infection was extensive. When the patient visited our hospital his initial symptoms had been developed 1 month before, and he had got primary THA 12 years before. We initially thought the infection caused by local reactivation or hematogenous spread but don't know exactly when the infection actually started. Medical therapy often fails when the infection is discovered months or years after arthroplasty. And removal of the prosthesis and ATM is necessary for a treatment²⁾. But interval from total joint replacement to onset of disease varied from 2 months to 38 years^{1,3-5,7-9)} (Table 1). Cases which had no previous history of TB, but revealed

active infection like pulmonary TB on further investigation, were presumed to be spreaded by hematogeneous route. Similarly, Marmor¹⁾ did a full survey for TB and there was one case of TB prosthetic knee infection with severe TB urinary tract infection who underwent a nephrectomy. A full survey for TB infection was done for this case where the sputum and urine for acid fast bacilli, tuberculin test and chest radiograph, were all negative.

Regardless of the time of the diagnosis, the treatment options available are treating with ATM with or without removal of prosthetic implant¹⁾. In cases where the prosthesis did not show signs of loosening and ATM started promptly has a good chance of retaining the prosthetic implant¹⁾. Some support the prosthetic implant removal when there is late onset of TB infection and others support the retaining the prosthetic implant, provided the prosthesis is stable and not loose. Usually, a two-stage reconstruction for failed THA due to bacterial infection has become generally accepted. But, in TB infected hip joint, it can be treated by primary THA as shown by Yoon et al.²⁾ that there was no reactivation of TB in 7 cases of immediate cementless THA in advanced active TB arthritis of hip. Kreder and Davey⁵⁾ reported a single-stage revision in THA revision with TB infection which has been treated with ATM, provided there is no more documented infection from hip aspirate.

As we know the mainstay for any TB infection is ATM but there is no proper consensus for the duration of treatment and which drugs to use for periprosthetic infection. The duration of ATM varied from 6 months to 36 months^{1,3-5,7-9)} (Table 1). However, Sidhu et al.¹⁰⁾ recommended prolong duration of ATM for 18 months from his series of 23 patients of THA in active advanced TB arthritis. Yoon et al.²⁾ used ATM for 12 months in active TB hip who underwent THA, in all 7 of patients. We stopped ATM after our patient showed clinical improvement and the ESR and CRP had been normalized (within normal range) for 6 months consecutively (Fig. 2).

The other option we had is, to use antibiotics impregnated cement spacer but with little research has been done with cement impregnated with ATM and only Khater et al.⁹⁾ has implanted vancomycin and rifampicin loaded beads after prosthesis removal. However, the bioavailability and the toxicity of these antibiotics are questionable. So, until further research is done there is

little role of antibiotics impregnated cement spacer in TB periprosthetic infection. From the literature search, nearly all patients with no prior TB infection underwent surgical procedure, ranging from debridement, removal of prosthesis, arthrodesis, resection arthroplasty and revision arthroplasty^{1,3-5,7-9)} (Table 1). The only patient, who did not go for a surgery is a periprosthetic TB infection of TKA which was cured by ATM⁷⁾.

Hence, from the literature review and this case report, treatment for TB periprosthetic infection has to be individualized according to each case. In this case the TB infection was clinically under control and the prosthesis was stable with insufficient bone stock. We decided to retain the prosthetic implant and use 4 drug ATM with good result for the past 8 years. We presume in this patient reactivation of local skeletal TB as the source of infection because the contralateral THA was not affected.

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국문초록

삽입물의 제거 없이 장기 약물요법을 이용한 인공 고관절 전치환술 결핵 감염의 치료

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인공관절 삽입물 주위 감염은 인공관절 수술의 큰 합병증 중 하나이며 삽입물 결핵 감염의 빈도는 증가하고 있는 추세이다. 인공 고관절 전치환술 후 광범위한 삽입물 주위 결핵 감염이 발생한 환자에서 삽입물의 제거 없이 장기간 항결핵제 복용과 변연절제술로 치료를 시행한 증례이다. 환자는 18개월 동안 4종의 항결핵제를 복용하였고 마지막 영상학적 검사상 재활성화 징후나 해리 없이 삽입물 주위로 새로운 골형성이 관찰되었다.

색인단어: 삽입물 주위 결핵 감염, 인공 고관절 전치환술, 항결핵제