

CASE REPORT

## An unusual cause of prosthetic joint infection: *Mycobacterium tuberculosis*

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### ABSTRACT

*Mycobacterium tuberculosis* is a rare cause of prosthetic joint infection. Early diagnosis is critical for a good treatment response. Here, we report a case of prosthetic joint infection due to *M.tuberculosis*. A32-year old woman was admitted to our clinic for fever and drainage of right hip with prosthesis. After several interventions, she was diagnosed as prosthetic infection due to *M.tuberculosis*. Although the diagnosis was delayed because of the difficulties to yield *M.tuberculosis*, the outcome was good with medical therapy for 12-month and staged exchange of prosthesis.

Approach to diagnosis must involve the histopathological examination of the tissue, mycobacterial cultures and acid-fast staining and when repeated cultures and examination of histological samples from infected joints are negative, tuberculosis should be kept in mind in the differential diagnosis of prosthetic joint infection. While the treatment modalities vary in English literature, it is clear that treatment must involve both medical and surgical approaches. *J Microbiol Infect Dis* 2012; 2(2): 72-75

**Key words:** Prosthetic joint, infection, tuberculosis

## Nadir görülen bir protez eklem enfeksiyon etkeni: *Mycobacterium tuberculosis*

### ÖZET

*Mycobacterium tuberculosis*, protez eklem enfeksiyonunda nadir görülen bir etkenidir. Tedavide başarı için erken tanı, kritik önem taşımaktadır. Bu yazımızda *Mycobacterium tuberculosis*'e bağlı bir protez enfeksiyonu vakasını ve literatür derlemesini sunmayı amaçladık. Kliniğimize ateşi ve protezli sağ kalçasında akıntısı olan 32 yaşında bir bayan hasta başvurdu. Birçok girişimden sonra *M.tuberculosis*'e bağlı protez enfeksiyonu tanısı konuldu. Vakamızda tanı gecikmiş olsa da, 12 ay medikal tedavi ve aşamalı protez değişimi ile sonuç olumlu oldu. Tanı amacıyla dokunun histopatolojik incelemesi, tüberküloz kültürü ve boyama kullanılabilir ve tekrarlanan kültür ve histolojik incelemelerin negatif çıkması halinde, ayırıcı tanıda tüberküloz akılda tutulmalıdır. Literatürde tedavi yaklaşımları farklılık göstermekle birlikte, tedavi hem medikal hem de cerrahi girişimi içermelidir.

**Anahtar kelimeler:** Protez eklem, enfeksiyon, tüberküloz

### INTRODUCTION

Prosthetic joint infection is a serious complication of joint arthroplasty. In patients with joint replacement, the infection rate is less than 1% in hip and shoulder prostheses, less than 2% in knee prostheses. The common bacterial causes of prosthesis joint infections are coagulase-negative Staphylococcus, *Staphylococcus aureus*, aerobic Gram-negative bacilli and anaerobes. *M.tuberculosis* is a rarely seen cause of prosthesis infection. Because the initial manifestations are similar to classical prosthesis infection,

the diagnosis is usually delayed. Infection generally originates from local reactivation. We report a case with prosthetic joint infection due to *M.tuberculosis* treated with both medical and surgical therapy, which must alert the clinician for the delayed diagnosis of prosthetic joint infections.

### CASE REPORT

A 32-year-old woman was referred to our department for fever and drainage of right hip. She had undergone right total hip arthroplasty for avascular necrosis of femoral head five years ago. Six

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Received: 12 March, 2012, Accepted: 02 June, 2012

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months later a revision surgery was made for aseptic loosening and one year after a new arthroplasty was applied for persistent aseptic loosening.

Eight months ago, swelling of right hip developed after a trauma. She was diagnosed as right trochanteric bursitis and drainage surgery was performed. The histopathological examination of the drained material revealed focal granulomatous reaction, foreign body reaction and fibrosis. No evidence of bacteria, acid fast bacilli or fungal elements identified on direct staining. Aerobic and mycobacterial cultures were also obtained and antibiotics treatment was started. Despite antibiotics treatment, purulent drainage started and two more operations were performed because of persistent drainage. Three weeks ago, fever was added to persistent drainage and she was hospitalized by orthopedics department.

On the first evaluation of the patient, purulent drainage of right hip was the only finding of her physical examination. Her fever was over 38°C. The laboratory findings on admission were as follows: Hematocrit 27.6%, leukocytes 6700/mm<sup>3</sup>, platelet count 415000/mm<sup>3</sup>, C-reactive protein (CRP) 113 mg/L (normal range: 0-5 mg/L), erythrocyte sedimentation rate (ESR) 111 mm/h. The repeated cultures of purulent material and blood cultures were negative. Radionuclide scan of her right hip was compatible with infection and she was diagnosed as having prosthetic infection. The prosthesis was removed, new cultures were obtained and a cement containing antibiotics was inserted. While waiting the results of new cultures, mycobacterial culture obtained previously yielded positive result for *M.tuberculosis* and she is diagnosed as prosthetic infection due to *M.tuberculosis*. She was started ethambutol and pyrazinamide (for first two months), isoniazid and rifampicin for twelve months.

At the tenth day of the treatment, CRP was 38 mg/dl and ESR was 90 mm/h. She was decided to apply new arthroplasty after treatment and discharged. At the end of the medical therapy, a new right hip arthroplasty was applied. After one year of last arthroplasty she had no complains and was doing well.

## DISCUSSION

Prosthetic joint infections, after total hip or knee replacement may develop at a rate of less than

1% for the hip and between 0.5 and 2% for the knee. Pain, fever, swelling and draining sinus tracts are the most commonly seen physical findings of prosthetic joint infections. Common bacterial etiologies are coagulase-negative Staphylococcus, *S.aureus*, aerobic Gram-negative bacilli and anaerobes. *M.tuberculosis* is a rarely seen cause of prosthetic infection.<sup>1</sup> Tuberculosis (TB) should always be considered in patients with clinical signs of prosthetic joint infection with negative routine cultures, prosthetic joint infections due to *M.tuberculosis* are generally insidious and indolent.<sup>2</sup>

The diagnosis depends on culture and histopathologic examination of tissue which may reveal acid-fast organisms or caseating granulomas; but granulomas can also represent as reaction to the prosthesis. Although Khater et al.<sup>3</sup> do not suggest obtaining mycobacterial cultures in all patients with bacterial prosthetic joint infections, those patients who fail to respond to appropriate or standard therapy should be cultured for the presence of mycobacteria. In addition Spinner et al.<sup>2</sup>, suggest that patients who experience relapses after successful treatment for bacterial infections should probably also have mycobacterial cultures, particularly if risk factors for tuberculosis or human immunodeficiency virus are present. Mycobacterial cultures are important to confirm the diagnosis. Coinfection with other bacteria cannot be ruled out, but persistence of clinical infection despite eradication of organisms is an important clue to the tuberculous infection.<sup>3</sup>

Prosthetic joint infection due to *M.tuberculosis* usually involving the hips or knees can result from either local reactivation or less often from hematogenous spread. Trauma is well-known as a predisposing factor in skeletal tuberculosis, and injury to tissue around the prosthesis could be important in such reactivation.<sup>1-3</sup> This raises the possibility that mechanical grinding of synovial tissue may lead to a breakdown of old TB granuloma, as a potential cause of TB reactivation.<sup>3</sup> In our patient's history, arthroplasty was applied for avascular necrosis. No previous history of tuberculosis and developing of infection after trauma in our patient, make the diagnosis avascular necrosis controversial as if it was a nidus for tuberculosis osteomyelitis.

**Table 1.** Reported cases about prosthesis infection due to *M.tuberculosis* in the English literature

Author, Year (Reference)	Joint	Time Passed from Arthroplasty to Joint Infection	Medical Therapy and Duration (Months)	Surgery	Follow-up
McCullough et al 1977 (5)	Hip	8 years	INH, RIF(18), STM(2)	Debridement	6 months
Zeiger et al 1984 (6)	Knee	4 years	NS	Resection Arthroplasty	NS
Levin et al 1985 (7)	Hip	4 years	INH, RIF (36), STM (3.5)	Resection Arthroplasty	2,5 years
Wolfgang et al 1985 (8)	Knee	1 year	INH, RIF (24)	Staged Exchange	1 year
Baldini et al 1988 (9)	Hip	2 years	NS	Resection Arthroplasty	4 months
Bryan et al 1990 (10)	Knee	8 years	INH, RIF, EMB (24)	Arthrodesis	3 years
Lusk et al 1995 (11)	Knee	15 years	INH, EMB, PZA (6)	Resection Arthroplasty	6 months
Al-Shaikh et al 1995 (12)	Knee	8 months	INH, RIF, PZA (12), EMB (9)	Arthrodesis	1 year
Ueng et al 1995 (13)					
Case 1	Hip	1,5 years	INH, RIF, EMB (24)	Staged Exchange	3 years
Case 2	Hip	14 years	INH, RIF, EMB (12)	Resection Arthroplasty	2 years
Tokumoto et al 1995 (14)					
Case 1	Hip	38 years	INH, RIF (12)	Arthrodesis	2years
Case 2	Knee	2 years	INH, EMB (18)	Debridement	8 years
Kreder et al 1996 (15)	Hip	4 years	INH, EMB, PZA (9)	Aceatbulum Revised	1,5 years
Spinner et al 1996 (2)	Knee	4 years	INH, EMB, PZA (9)	Debridement	2,5 years
Carlsson et al. 1997 (16)	Hip	3,5 years	INH, RIF(12), PZA(2)	Resection Arthroplasty	NS
Berbari et al 1998 (17)					
Case 1	Hip	30 years	INH (19), RIF (1), EMB (19)	Resection Arthroplasty	10 years
Case 2	Hip	23 years	INH, EMB (16)	Resection Arthroplasty	8 years
Case 3	Hip	10 years	INH, RIF(15)	Staged Exchange	7 years
Case 4	Hip	1 year	INH(12), RIF(7), EMB(9)	Resection Arthroplasty	20 years
Case 5	Hip	2 years	INH, RIF(39), STM, EMB(6)	Staged Exchange	12 years
Case 6	Hip	3 years	INH(24), RIF(3), EMB (12)	Debridement	8 years
Case 7	Hip	2 years	INH(24), RIF(6), EMB(24)	Debridement	19 years
Krappel et al 2000 (18)	Hip	2 months	INH, RIF(12), STM(3)	Rev Arthroplasty	2,5 years
Fernandez-Valencia et al 2003 (19)	Hip	6 months	INH, RIF (12), EMB (3)	Resection Arthroplasty	6 years
Boeri et al 2003 (20)	Hip	2 years	INH, RIF (13), EMB, PZA(4)	No Surgery	6 years
Marmor et al 2004 (21)					
Case 1	Knee	3 months	INH, RIF, PZA (6)	Revision Arthroplasty	7 years
Case 2	Knee	2 months	INH, RIF, PZA (6)	Revision Arthroplasty	5 years
Case 3	Knee	4 months	INH, EMB, PZA(8)	Debridement	1,5 years
Shanbag et al 2007 (22)	Hip	15 months	RIF, PZA, EMB (12)	Rev Arthroplasty	1,5 years
Wang et al 2007 (1)	Knee	3 years	INH, RIF, PZA, EMB(ND)	Debridement	Died
Khater et al 2007 (3)	Knee	3 months	INH, EMB(18)	Rev Arthroplasty	1,5 years
Present case	Hip	5 years	INH, RIF(12), PZA, EMB(2)	Staged exchange	1 year

NS: Not supplied, INH: Isoniazid, RIF: Rifampicin, EMB: Ethambutol, PZA: Pyrazinamide, STM: Streptomycin

Treatment of patients with tuberculous infection after prosthetic implantation remains a major challenge. There are diverse treatment modalities present in the medical literature, including antibiotics and the removal of the components; antibiotics, aggressive debridement and retention of the components; and antibiotics alone.<sup>1</sup> Different treatment modalities were used in the case series. The necessity for removal of the infected prosthetic joint in addition to adjunctive anti-tuberculous therapy remains controversial. Trampuz and Zimmerli<sup>4</sup> suggest that prosthesis infections with sinus tracts must be treated with removal of the prosthesis and Khater et al.<sup>3</sup> also advice that surgical removal in combination with anti-tuberculous therapy is typically necessary for cure, because patients with tuberculous infections discovered months or years after joint arthroplasty often fail medical therapy. Because our country is endemic for tuberculosis, we have decided to treat our patient with four drugs, for 12 months and exchange the prosthesis.

The reported cases about prosthesis infection due to *M.tuberculosis* in the English literature were listed in Table 1. In 12 and 19 cases, knee and the hip were the involved joints, respectively. There are remarkable differences in the management of these cases by each of the authors. Medical management with anti-tuberculous drugs showed significant variations in duration. The surgical options used also varied and most commonly a resection arthroplasty was performed.

In conclusion, tuberculous infection of prosthetic joint is a rare disease and its diagnosis depends on high clinical suspicion, especially in the setting of persistent drainage with negative cultures. Because early diagnosis has been shown to decrease morbidity, acid-fast bacilli smears and cultures, as well as histologic materials, should be ordered routinely in those patients with signs of infection undergoing total joint replacement and the treatment of the prosthetic joint infection due to *M.tuberculosis* must involve both medical and surgical approach.

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