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Short communication

Postoperative *Mycobacterium tuberculosis* infection after total knee arthroplasty ☆

Chia-Lin Lee [a], Yeou-Sheng Wei [a], Yuh-Jiun Ho [b], Chian-Her Lee [c,*]

[a] Orthopaedics Division, Kaohsiung Armed Forces General Hospital, Kaohsiung, Taiwan, ROC
[b] Hualien Armed Forces General Hospital, Taiwan, ROC
[c] Department of Orthopedics, Taipei Medical University Hospital, Taiwan, ROC

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ABSTRACT

The tuberculosis prosthetic joint infection is a rare complication. We reported a case of tuberculosis prosthetic joint infection following total knee arthroplasty, and the infection was controlled without the removal of implant with the anti-tuberculosis drugs for 12 months and there has been no evidence of recurrence. Although the tuberculosis prosthetic joint infection is few of all prosthetic joint infection, early appropriate treatment can make good result without the removal of implant. This case appeared to be an early postoperative tuberculosis infection in a patient with no prior history of tuberculosis and hence conclusion could be made that early postoperative tuberculosis infection after total knee arthroplasty may occur in a patient with no prior history of exposure to tuberculosis.

1. Case report

The patient was a 79-year-old woman who has suffered from osteoarthritis of the right knee (Fig. 1) for many years. Total knee arthroplasty was performed on July 2006. She had no prior exposure or history of tuberculosis infection before this operation. During this operation, the synovial tissue and fluid looked normal in appearance with no hypertrophic change or casseous necrotic tissue. Two months after the operation, pain and diffuse swelling of the right knee with limitation of movement was presented (Fig. 2). Arthrocentesis showed bloody synovial fluid. The culture and Gram stain from the aspirated synovial fluid were both negative. Radiographs showed no signs of component loosening. Chest radiographs also demonstrated no evidence of tuberculosis. Full blood count and biochemistry examinations were normal. The erythrocyte sedimentation rate in 4 h and C-reactive protein level were both slightly elevated. On exploration of right knee joint, hemorrhagic synovium and bloody fluid were found. Irrigation and debridement were performed, and the prosthesis was retained due to good fixation. Histological examination of synovial tissue showed chronic granulomatous inflammation with granuloma formation in the presence of multinucleated giant cells, epithelioid histiocytes, and central necrosis (Fig. 3). The tuberculosis bacilli were identified with TB histochemical stain (Fig. 4). Anti-tuberculosis therapy with Rifater and Myambutol was initiated since November 2006 for 12 months. CRP level returned to normal on the fourth month at post-operative follow-up. At thirteen month, there was no sign of prosthetic loosening (Fig. 5), and the patient had mild limited range of motion of knee joint with 15 to 105° in flexion and independent weight-bearing.

2. Discussion

In this case, could the infection have been caused by intraoperative contamination of the joint which is an inherent risk of surgery? It appears this may be a nosocomial infection which the patient acquired as a complication of her surgery. We have reviewed the operative schedule in our hospital, and no active tuberculosis patients received the operation 1 week before this patient received the knee arthroplasty, and no active tuberculosis happened to all employees in our operative room in one year follow-up. Tuberculosis prosthetic joint infection usually involves the hips or the knees and are most commonly the results from either local reactivation or occasionally from hematogenous spread [1]. In a retrospective study of 2116 episodes of PJI over a period of 22 years, only 7 (0.3%) were due to tuberculosis [2]. The risk of reactivation of tuberculosis in patients undergoing THA or TKA for quiescent tuberculosis native septic arthritis varies between 0% and 31%. It is higher for patients receiving TKA (27%) than those with THA (6%) [2]. Intra-articular steroid injections have been suggested as a predisposing factor for such variation [3]. Only about one-third of patients who have tuberculosis of a bone or joint have a history of pulmonary disease [4]. In this case, the patient didn't have history of pulmonary tuberculosis, and the sputum culture for tuberculosis was negative. The chest radiographs

☆ A case of mycobacterium tuberculosis infection was reported two months following a total knee arthroplasty. The patient had no previous exposure or history of tuberculosis infection prior surgery. There was no evidence of active tuberculosis at any other sites when the diagnosis was made. The infection responded well to standard anti-tuberculosis drugs for 12 months with retention of the prosthesis.

* Corresponding author. Department of Orthopedics, Taipei Medical University Hospital, No.252, Wuxing St., Xinyi District, Taipei City 110, Taiwan, ROC. Tel.: +886 2 27372181.
E-mail address: ChianherLee@yahoo.com.tw (C.-H. Lee).

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Fig. 1. Preoperative radiograph showed an osteoarthritis with narrowing of lateral compartment.

did not show any signs of tuberculosis. From the epidemiological study in Taiwan, the area where the patient is from has a higher prevalence of extra-pulmonary tuberculosis than other regions in Taiwan. We therefore suspected that the patient might have suffered from tuberculosis prosthetic joint infection due to local reactivation of a previously dormant focus of infection or hematogenous spread after arthroplasty. The final diagnosis was made based on the pathological

Fig. 2. Following total knee arthroplasty for 2 months, the knee showed a diffuse swelling with effusion and limitation of movement.

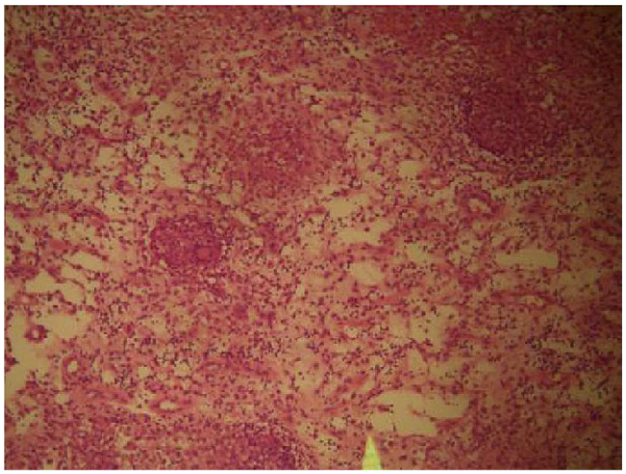

Fig. 3. Histology of synovium showed chronic granulomatous inflammation with granulomas formation, presence of multinucleated giant cells, epithelioid histiocytes, and central necrosis (100×).

report, and prognosis turned out well after receiving anti-tuberculosis treatment.

Diagnosing osteoarticular TB can be difficult and is best made by synovial fluid culture and synovial biopsy. In addition to histological examination, tissue should be sent for culture, which may increase diagnostic yield [5]. Another series revealed that 22 out of the 25 patients, the diagnosis was confirmed by histological examination of the material obtained from the lesions, and *Mycobacterium tuberculosis* was cultured in nine cases [6]. As for tuberculosis native joint arthritis, the rate for positive synovial fluid cultures is 79% and for positive biopsy specimens is 94% [7]. The diagnosis of tuberculosis prosthetic joint infection is often delayed due to a low level of clinical suspicion and also unusual clinical presentation in patients at risk. In our case, we did not send the synovial tissue for pathological examination because there was no any sign of tuberculosis before and during operation, and the synovial tissue at that time reflected a normal reaction to osteoarthritis of knee. We concluded that tuberculosis infection should always be considered in the presence of atypical prosthetic joint infection or whenever there is an inadequate response to treatment. Even though the infection source in this patient is still unclear, we believed that the tuberculosis infection most likely happened following total knee arthroplasty.

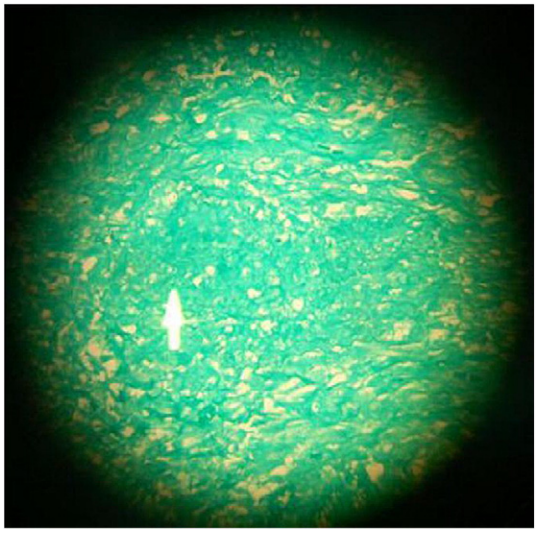

Fig. 4. Histology of synovium presenting tuberculosis bacilli were identified with TB histochemical stain (400×).

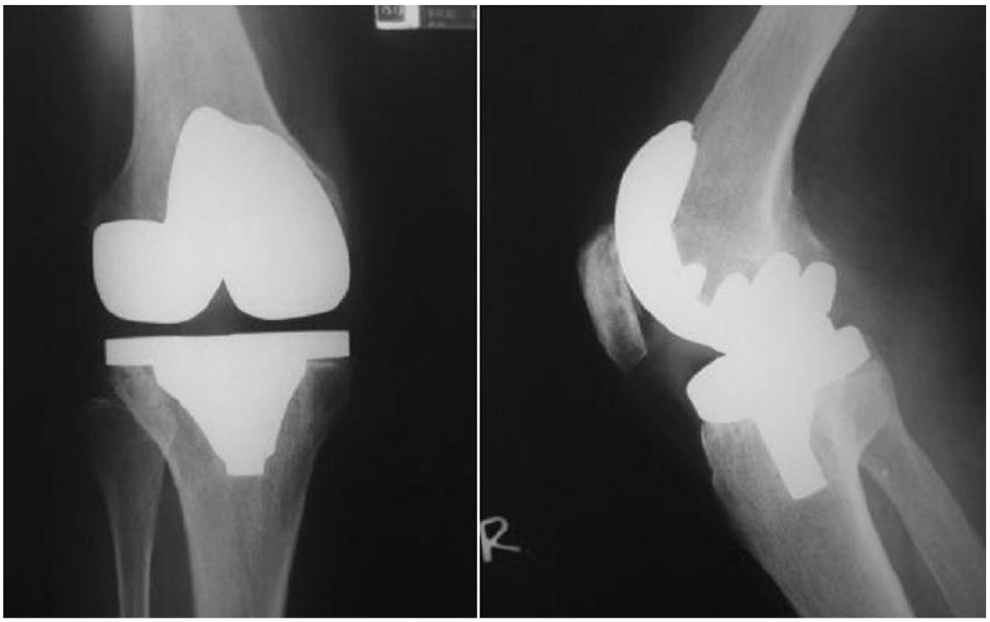

Fig. 5. The radiographs at 13 months after debridement showed a good alignment and well fixation of prosthesis.

It is still unclear what the optimal therapy is for tuberculosis prosthetic joint infection [8]. In this case, after 13 months of follow-ups, the range of motion in the right knee was from 15 to 90° in flexion, and the patient could walk independently without any support. The radiography showed no sign of prosthesis loosening. Such result seemed to be satisfactory. Fortunately, the diagnosis was made at an earlier stage for this case, with immediate debridement and anti-tuberculosis drugs given. Patients with unsuspected tuberculosis septic arthritis discovered at the time of implantation or in the early postoperative period could be successfully treated with anti-tuberculosis drugs for 12–18 months [2,9]. For those with late onset of tuberculosis prosthetic joint infection, medical treatment alone is usually unsuccessful and two-stage exchange is often required [1,2,10,11].

Routine bacterial and anaerobic cultures often fail to yield the pathogens after prosthetic joint infection, hence atypical microorganisms should always be considered [12]. Despite the recent advance in molecular microbiology techniques, the experience with the use of PCR for detection of tuberculosis in synovial fluid is still limited [13,14]. We must confirm tuberculosis pathogen from synovial fluid by pathological examination and culture [15]. However, tuberculosis culture usually requires 2 to 4 weeks [16], and hence accurate pathological report becomes an important diagnostic tool. With the increasing practice of prosthesis implantation, the rate of prosthetic joint infections may be increasing. This case indicates that early postoperative knee infection complicating total knee arthroplasty can be caused by tuberculosis in a patient with no prior history of known exposure. When pathogens could not be identified in cases of prosthesis joint infections, always remember the possibility of tuberculosis.

Conflict of Interest Statement

I, Chian-Her Lee, declare that I have no proprietary, financial, professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled, Mycobacterium tuberculosis infection following total knee arthroplasty in case with no prior history of tuberculosis.

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