



Total hip replacement infected with *Mycobacterium Tuberculosis* A case report with review of literature

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***Mycobacterium Tuberculosis* infection of a total joint prosthesis in patients with previous pulmonary or osteoarticular tuberculosis is well recorded in literature. We describe the case of a 59-year-old woman with tuberculous infection complicating a total hip arthroplasty 15 months after surgery for osteoarthritis. The patient had no prior history of exposure to tuberculosis and no evidence of pulmonary or osteoarticular tuberculosis. She was treated with four-drug antituberculous chemotherapy for 12 months with retention of the prosthesis. The purpose of this case report and literature review is to highlight to the Western Orthopaedic surgeon the importance of keeping in mind a differential diagnosis of tuberculosis while dealing with prosthetic joint infections. The infection of a joint with *Mycobacterium Tuberculosis* in patients without previous tuberculosis is very uncommon. We have reviewed the surgical and medical management of the cases reported in literature.**

Keywords : total hip replacement ; *Mycobacterium Tuberculosis* ; infection.

INTRODUCTION

There has been a reversal of the decline in incidence rates of tuberculosis in the United

Kingdom (3). The increase in incidence of pulmonary tuberculosis has been associated with an increase in osteoarticular tuberculosis. Extra pulmonary tuberculosis with or without lung involvement accounts for almost 20% of infections with *Mycobacterium Tuberculosis* (MTB) (8). Between 0% and 31% of patients undergoing prosthetic joint replacements for MTB septic arthritis will develop MTB prosthetic joint infections after arthroplasty (4). There are 22 cases reported in literature of MTB prosthetic joint infection with no previous history of pulmonary or extra-pulmonary tuberculosis (1, 2, 4, 6, 7, 9, 11-21).

CASE REPORT

A 59-year-old Caucasian woman presented with a 10-year history of right hip pain. At clinical

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Fig. 1. — Pre-operative AP view : Lytic lesion in greater trochanter and femoral neck.



Fig. 2. — Pre-operative lateral view

examination, she had an antalgic gait and the hip was fixed in 10° of flexion and adduction, with a further flexion of 60°. Radiographs of her pelvis and right hip confirmed the clinical diagnosis of severe osteoarthritis but also revealed a lytic lesion in the greater trochanter and an erosion of the superior cortex of the femoral neck with irregularity within the neck itself (figs 1, 2). Blood analysis checked at that time was almost normal : WBC : $10.9 \times 10^9/L$, ESR : 13 mm/hr, CRP : 9.1 mg/L and RA factor negative. Preoperative chest radiograph did not suggest a primary tuberculous focus. There was no history of tuberculosis, TB contact, travel to endemic areas or any systemic medical disease.

Investigations

We decided to image the lytic area further. A bone scan was performed, which showed increased uptake in the right acetabulum and head of the

femur. CT scan revealed erosion of the superior head and neck. CT guided Fine Needle Aspiration Cytology (FNAC) was performed which showed only blood. Bacteriological investigation was not undertaken.

Core biopsy of the femoral head under image control showed no evidence of malignancy and no specific diagnostic features.

Surgery

The patient underwent a total hip replacement in November 2002 through a modified Hardinge approach with an uncemented Exceed cup (Biomet UK) and a cemented Stanmore stem with Palacos Gentamycin cement. Intra-operatively no features suggestive of acute joint infection were noted. The post-operative period was uneventful. Histological assessment of femoral head and synovium revealed features suggestive of chronic inflammation con-

taining well formed granulomas of uncertain significance. No foreign material was identified or evidence of bacteria, acid fast bacilli or fungal elements on direct staining. Culture for MTB was not performed.

Post-operative Investigations

Fifteen months post-op, the patient presented with a 5-week history of pain and swelling around the right hip. There was no history of fever. She was systemically well but had a diffuse small firm swelling at the upper end of the suture line, and redness and induration near the gluteal fold. Radiographs were unremarkable (figs 3, 4). Blood investigations showed a WBC : $13 \times 10^9/L$, ESR : 72 mm/hr, and CRP : 34.7 mg/L. Aspiration of the hip joint under image control revealed a dry tap, but frank pus was aspirated from the gluteal region. Pus culture and blood culture did not grow any organisms. An MRI was performed which showed two thick fluid collections, proximally at the level of the acetabular prosthesis, measuring 6.6 cm in diameter and a lesion measuring 8 cm lower down in the lateral aspect of the thigh. On the axial view the lower collection appeared to be very close to and possibly communicating with the lower end of the prosthesis. A white cell labelled scan showed mild tracer accumulation at the level of the lower and larger abscess seen on MRI.

The patient was empirically started on intravenous antibiotics (flucloxacillin and benzyl penicillin) but showed no clinical response.

Treatment

A week later the gluteal abscess was incised and drained, and 100 ml of pus was evacuated along with a lump of caseous material, 2 cm in diameter. Pus culture grew 3 different coagulase negative staphylococci sensitive to Flucloxacillin and Fusidic acid. Histology sections showed amorphous necrotic material, scattered inflammatory reaction including plasma cells, macrophages and multinucleated cells. There were areas of small poorly formed granulomas. Stains for fungi and acid-fast bacilli were negative. On special media the pus grew *Mycobacterium Tuberculosis*. The

patient was given Rifampicin, Ethambutol, Pyrazinamide and Pyridoxine for 12 months. He developed a gluteal sinus which continued to discharge off and on over 6 months, after which it healed completely. Radiographs show a well fixed, stable prosthesis (figs 5, 6). At 18 months follow-up, the patient is totally asymptomatic with healed wounds and a full range of painless hip movements.

DISCUSSION

Osteoarticular tuberculosis is thought to represent an haematogenous diffusion from an activated primary process, most frequently in peri-bronchial and mesenteric lymph nodes (2). Extrapulmonary tuberculosis accounts for 20% of all MTB infections and of this osteoarticular tuberculosis accounts for 1-5% of all cases (4). The incidence of tuberculosis has increased by almost 30% annually in the UK (3).

Orthopaedic surgeons are now more likely than before to encounter patients affected with *Mycobacterium Tuberculosis*.

The lack of evidence of systemic tuberculosis often contributes to an erroneous diagnosis of degenerative osteoarthritis especially in western clinical practice. Misdiagnosis is possible and arthroplasty is occasionally performed on an unsuspected affected joint, causing re-activation of the disease (5, 20). Prosthetic joint infection presents a management challenge and it is important to be aware of tuberculosis as a differential diagnosis. MTB infection of a total joint prosthesis in patients with previous pulmonary or osteoarticular tuberculosis is reported to have an incidence between 0% and 31% (4, 10). It has also been noted that the risk is increased in total knee arthroplasty compared to total hip arthroplasty (4). Kim *et al* (8) have reported that patients with no evidence of active MTB septic arthritis for more than 10 years prior to implantation and negative cultures of joint tissue at the time of implantation were at decreased risk of re-activation.

The infection of a joint with MTB in patients without previous tuberculosis is very uncommon.

Only 22 cases have been noted in a search of the English language literature from 1966-2005



Fig. 3. — Post-infection AP view



Fig. 4. — Post-infection lateral view

(table I). Twelve cases (54.5%) were total hip replacements and 10 were total knee arthroplasty cases. Six cases presented with joint infection within one year of undergoing prosthesis implantation. There is a big difference in the management of these cases by each of the authors. Medical management with anti-tuberculous drugs showed a great variation in duration (6 months to 36 months) and choice of drugs (2-4 drug chemotherapy). Ten out of 20 patients (data not available on 2 cases) received more than 12 months of anti-tuberculous treatment. The most commonly used combination was Isoniazide, Rifampicin and Ethambutol. The surgical options used also varied and most commonly a resection arthroplasty was performed (8 cases). The prosthesis was retained in 5 cases under cover of antituberculosis chemotherapy.

Debridement was carried out in 4 of these cases and no surgical intervention was deemed necessary in one case. The prosthesis was revised in 6 patients. In all cases revision was a staged exchange with antibiotic spacers used at first surgery and an interval between the two procedures ranging from 3 to 22 months. In 3 cases (2 knees and 1 hip) arthrodesis was performed.

In our patient a thorough pre-operative screening in the form of blood investigations, chest radiograph, CT guided biopsy and even a core biopsy of the lytic area in the femoral head did not diagnose, nor exclude MTB infection pre-operatively. It is possible that the diagnosis of “tuberculous coxalgia” was missed preoperatively. We did not perform MTB cultures on our pre-operative biopsy samples. The pathogenesis is therefore unclear as



Fig. 5. — 18-month follow-up radiographs

to whether it is a *de novo* case of MTB joint infection or a reactivation of an old lesion. It is important to note that synovial histology, mycobacterial culture (Löwenstein-Jenson culture media) and acid fast bacilli smears will confirm greater than 90% of tuberculous infections (4, 6).

Our case reiterates the point that tuberculosis is difficult to diagnose and surgeons should have a high index of suspicion, especially in recalcitrant infections where repeated smears and histology examinations from infected joints are negative.



Fig. 6. — 18-month follow-up radiographs

Given the wide variation in medical and surgical treatment of the cases illustrated in our review, we would recommend that each case should be considered on its individual merit. We used 4-drug therapy for 12 months with a good result. The majority of authors in our review resected or revised the infected prosthesis. We are of the opinion that if the infection is clinically under control and the prosthesis is stable, medical treatment alone should suffice.

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Table I. — Review of Literature

Author	Joint	Time Elapsed from Arthroplasty to Joint Infection (months)	Medical Therapy And Duration	Surgery	Follow-up
Marmor <i>et al</i> (14)	Knee	3 months	INH, RIF, PZA (6)	Revision Arthroplasty	7 years
Marmor <i>et al</i> (14)	Knee	2 months	INH, RIF, PZA (6)	Revision Arthroplasty	5 years
Marmor <i>et al</i> (14)	Knee	4 months	INH, EMB, PZA (8)	Debridement	18 months
Fernandez-Valencia <i>et al</i> (9)	Hip	6 months	INH, RIF (12), EMB (3 m)	Resection Arthroplasty	6 years
Boeri <i>et al</i> (6)	Hip	24 months	INH, RIF (13), EMB, PZA(4)	No Surgery	6 years
Al-Shaikh <i>et al</i> (1)	Knee	8 months	INH, RIF, PZA (12), EMB (9 weeks)	Arthrodesis	1 year
Berbari <i>et al</i> (4)	Hip	30 years	INH (19), RIF (1), EMB (19)	Resection Arthroplasty	10 years
Berbari <i>et al</i> (4)	Hip	23 years	INH, EMB (16)	Resection Arthroplasty	8 years
Berbari <i>et al</i> (4)	Hip	10 years	INH, RIF (15)	Staged exchange	7 years
Kreder <i>et al</i> (11)	Hip	4 years	INH, EMB, PZA (9)	Acetabulum Revised	18 months
Spinner <i>et al</i> (16)	Knee	4 years	INH, EMB, PZA (9)	Debridement	2.5 years
Lusk <i>et al</i> 1995 (13)	Knee	15 years	INH, EMB, PZA (6)	Resection Arthroplasty	6 months
Tokumoto <i>et al</i> (17)	Hip	38 years	INH, RIF (12)	Arthrodesis	2 years
Tokumoto <i>et al</i> (17)	Knee	1.7 years	INH, EMB (18)	Debridement	8 years
Ueng <i>et al</i> 1995 (18)	Hip	1.5 years	INH, RIF, EMB (24)	Staged Exchange	3 years
Ueng <i>et al</i> 1995 (18)	Hip	14 years	INH, RIF, EMB (12)	Resection Arthroplasty	2 years
Baldini <i>et al</i> (2)	Hip	1.7 years	NS	Resection Arthroplasty	4 months
Levin <i>et al</i> 1985 (12)	Hip	4 years	STM (3.5), INH, RIF (36)	Resection Arthroplasty	2.5 years
Wolfgang <i>et al</i> 1985 (19)	Knee	1 years	INH, RIF (24)	Staged Exchange	12 months
Zeiger <i>et al</i> 1984 (21)	Knee	4 years	NS	Resection Arthroplasty	NS
Bryan <i>et al</i> 1990 (7)	Knee	8 years	INH, RIF, EMB (24)	Arthrodesis	3 years
McCullough <i>et al</i> 1977 (15)	Hip	7.8 Years	STM(2), INH, RIF(18)	Debridement	6 months

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

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