Clinical Case Report

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A case report of severely damaged hip joint caused by SAPHO syndrome treated with 2-stage total hip arthroplasty

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Abstract

Introduction: Synovitis, acne, pustulosis, hyperostosis, and osteitis (SAPHO) syndrome is an increasingly recognized entity. The hip joint is known as a less frequently affected site in SAPHO syndrome, and there has been limited reports about hip joint diseases caused by SAPHO syndrome, and as such adequate treatment for this disease spectrum is still not fully elucidated.

Case: We describe the case of a 52-year-old man admitted for SAPHO syndrome who went on to be diagnosed with advanced secondary hip arthritis associated with disabling right hip pain. The diagnosis of SAPHO syndrome was delayed; the patient was given a clinical diagnosis of osteomyelitis and treated with prolonged courses of antibiotics and open surgical debridement at previous tertiary health facility. The patient underwent 2-stage joint replacement surgery in our hospital. At 1 year after the surgery, he is well, with minimal right hip pain and the prosthesis is functioning well.

Conclusion: This case shows the safety and effectiveness of the 2-stage joint replacement in treating destructive hip disease caused by SAPHO syndrome mimicking infectious arthritis.

Abbreviations: CRP = C-reactive protein, ESR = erythrocyte sedimentation rate, MRI = magnetic resonance imaging, PMMA = polymethyl methacrylate, SAPHO = synovitis, acne, pustulosis, hyperostosis, and osteitis, THA = total hip arthroplasty.

Keywords: hip joint, SAPHO syndrome, total hip arthroplasty

1. Introduction

In 1987, Chamot et al[1] first introduced the concept of synovitis, acne, pustulosis, hyperostosis, and osteitis (SAPHO) syndrome to describe the osteoarticular and dermatological lesions, and in 1994, Kahn and Khan[2] proposed the diagnostic criteria of SAPHO syndrome. In addition, the most commonly affected skeletal sites are known to be the anterior chest wall, including the sternoclavicular, manubriosternal, and costosternal joints[3,4]; however, iliac and femoral osteitis have also been reported.[5,6] Due to the variety of clinical presentations, the treatment of SAPHO syndrome remains a challenge and outcomes are known to be disappointing. Attention to SAPHO syndrome, especially for treatment, has been increasing recently. Also, the treatment of the SAPHO syndrome has been predominantly conservative and many studies have been reported concerning the results of medical treatment. Surgery, meanwhile, has been considered for patients whose condition has failed to respond to all other therapeutic interventions.[7] The hip joint is known as a less frequently affected site in SAPHO syndrome, and there has been limited reports about hip joint diseases caused by SAPHO syndrome, and as such adequate treatment for this disease spectrum is still not fully elucidated. Our patient was suffering from right hip joint pain for several years without accurate diagnosis and appropriate target therapy. He complained of severe right hip pain with limited range of motion of the hip joint. Radiological examination demonstrated severe secondary osteoarthritic hip joint disease indicated for joint replacement surgery. We were confronted with a great challenge due to the absence of approved guidelines for surgical treatment of severely damaged hip joint caused by SAPHO syndrome. In the following report, we describe a case where a 2-stage total hip arthroplasty (THA) was successfully employed and managed the severely damaged right hip joint caused by SAPHO syndrome.

2. Case report

A 52-year-old male was referred to us with severe right hip pain worsening for the last 3 years. He was an otherwise healthy man with no other medical or trauma history. At the previous health facility, he was given a clinical diagnosis of chronic osteomyelitis and treated with prolonged courses of antibiotics and open surgical debridement. However, notwithstanding all these treatments, the right hip pain continued with limited range of motion of right hip joint. On arrival, physical examination of the whole

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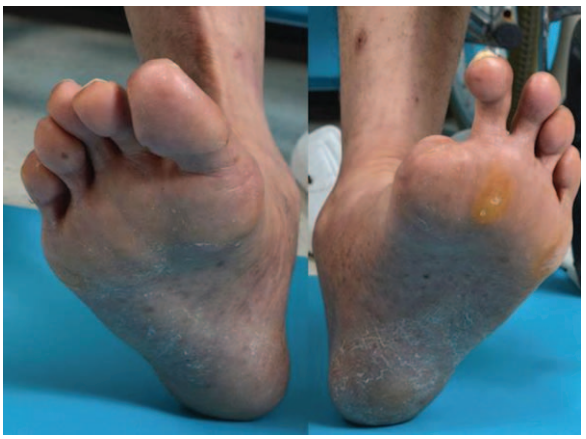

Figure 1. Plantar pustulosis on both feet.

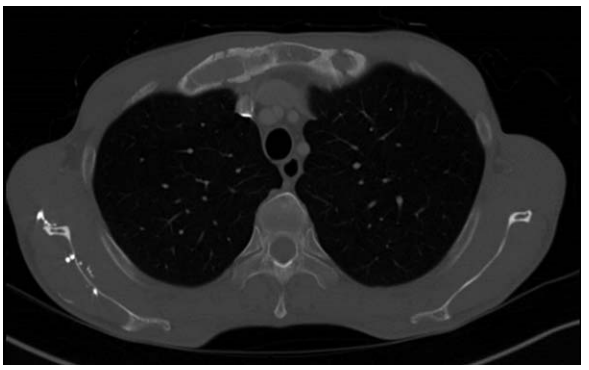

Figure 3. Computed tomography of the chest demonstrated sclerotic lesions of the medial end of the clavicle and manubrium.

body was performed, and the examination demonstrated disabling motion pain and significant loss of range of motion on his right hip joint with plantar pustulosis on both feet (Fig. 1). Laboratory examinations were normal, except for significant increases in C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) (2.92 mg/dL and 57 mm/h, respectively). Systemic radiographic examinations were carried out. The right hip demonstrated evenly narrowed joint space and osteophyte formation with multiple cystic lesions at the femoral head and acetabulum (Fig. 2). Manubriosternal joint, both 5th metatarsal bones of feet, demonstrated irregular cortical thickening with mixed radio-density suggesting osteitis (Fig. 2). Computed tomography of the chest demonstrated sclerotic lesion of the medial end of the clavicle and manubrium (Fig. 3). Magnetic resonance imaging (MRI) of the right hip demonstrated periosteal new bone formation with multiple subcortical cysts in the right ilium, suggesting osteomyelitis, cartilage denudation and joint space narrowing of right hip joint associated with osteophyte formation, and subchondral bone cysts in right iliac and acetabulum suggesting secondary osteoarthritis. MRI also demonstrated increased signal intensity in gluteus muscle and iliacus muscle, joint effusion, synovitis, and sacroiliitis (Fig. 4). Bone scintigraphy demonstrated increased tracer uptake in the right hip joint and manubrium and sternoclavicular joints (Fig. 5). These findings were suggestive of SAPHO syndrome. Due to the severe disabling hip pain and end-stage joint destruction caused by osteitis resistant to previous antibiotic treatment and open surgical debridement, we planned to employ total joint replacement surgery for this problem. However, we cautiously approached this case with 2-stage THA as a definitive surgery, considering possible infectious osteitis involving the right hip joint.

In the first stage, all necrotic and devitalized tissues were removed, and the functional temporary prosthesis was inserted with the cement mixed with vancomycin and streptomycin. A tissue biopsy (5–6 specimens from acetabulum and femur) was collected and sent for extended cultures for 2 weeks.[8] Intraoperative findings demonstrated that the femoral head and the acetabulum were severely eroded at the whole right hip joint where the cartilage had peeled off. Slightly dark brown colored joint fluid was seen without grossly pus-like fluid. Femoral neck cutting and extensive synovectomy around the right hip joint was performed, and frozen biopsy demonstrated <5 neutrophil counts/mm^3 in all intraoperative specimens. Vancomycin powder (3 g) and 1 g of streptomycin were mixed for each bag (40 g) of antibiotic-impregnated polymethyl methacrylate (PMMA), which was applied in the doughy phase to the temporary functional hip prosthesis. The prosthesis was inserted during the late stages of polymerization to minimize osseous interdigitation to facilitate later removal in the second stage. As with the femoral component, we added 3 g of vancomycin powder and 1 g of streptomycin for each bag (40 g) of antibiotic-impregnated PMMA. Numerous intraoperative samples were obtained for microbiological analysis during the

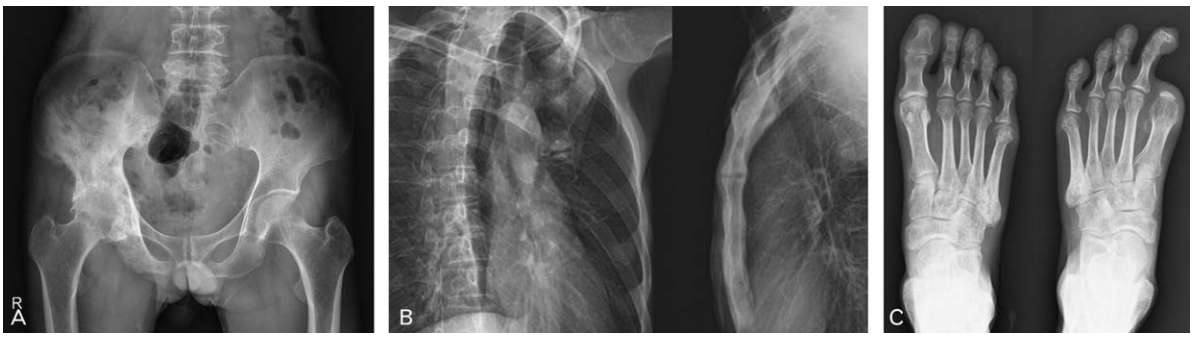

Figure 2. Multiple lesions were detected in different sites by simple radiograhs. (A) Simple radiograph of both hip anteroposterior view demonstrated evenly narrowed joint space and osteophyte formation with multiple cystic lesions at the femoral head and acetabulum of right hip joint, (B and C) irregular cortical thickening with mixed radio-density suggesting osteitis in manubriosternal joint and both 5th metatarsal bones of feet.

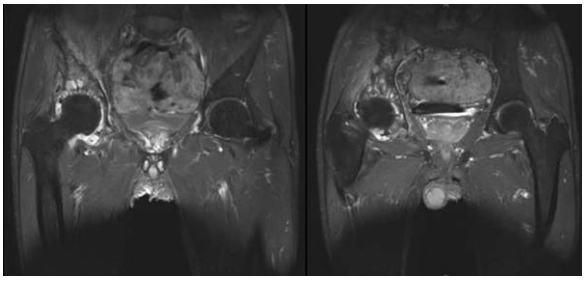

Figure 4. MRI of the right hip demonstrated periosteal new bone formation with multiple subcortical cysts in right ilium and cartilage denudation and joint space narrowing of right hip joint associated with osteophyte formation and subchondral bone cysts in the right iliac and acetabulum suggesting secondary osteoarthritis. MRI also demonstrated increased signal intensity in the gluteus muscle and iliacus muscle, joint effusion, synovitis, and sacroiliitis. MRI = magnetic resonance imaging.

first stage. Gram stain and culture from right hip joint intraoperatively were all negative. Histopathologic examination demonstrated dense lymphoplasmacytic infiltration with synovial hyperplasia, which is suggestive of secondary osteoarthritis. During the interval period between the 2 stages, intravenous antibiotics were administered for just 1 day postoperatively without further antibiotics and patient was allowed to mobilize and ambulate partial weight-bearing with frame the day after surgery. The patient was followed clinically, laboratory for CRP and ESR and radiologically, provided that wound healing and inflammatory mediators levels are satisfactory (CRP < 1.0 mg/dL and ESR < 30 mm/h),[8] antibiotics discontinued and second stage performed. In the second stage, intraoperative findings demonstrated that there was no evidence of infection. The decision was made to perform conversion to permanent THA. Implantation of a total hip prosthesis at the time of the second-stage operation was successful, with no growth of a microorganism on any culture specimen obtained from the operative site

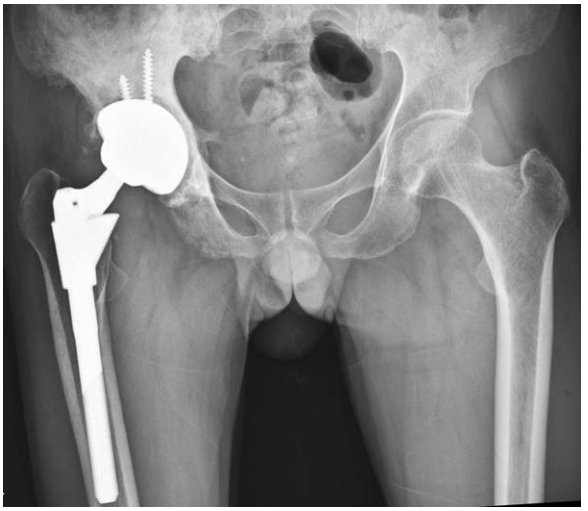

Figure 6. Radiograph taken 1 y after the 2-stage total hip arthroplasty showed well-fixed prosthesis in the right hip.

during the second-stage surgery. At 6 months postoperatively, the patient started ambulating without any assistant devices, and had minimal hip pain well controlled by low-dose oral nonsteroidal anti-inflammatory drugs.

At the present time, the patient is 1 year after the second-stage operation. The hip prosthesis was fully integrated without signs of component loosening, with very good functional outcomes (Fig. 6). Informed consent was given by the patient.

3. Discussion

To date, SAPHO syndrome is considered to be a rare disease whose real prevalence may be underestimated.[1,3,9–12] Due to the variety of clinical presentations, the diagnosis and treatment of

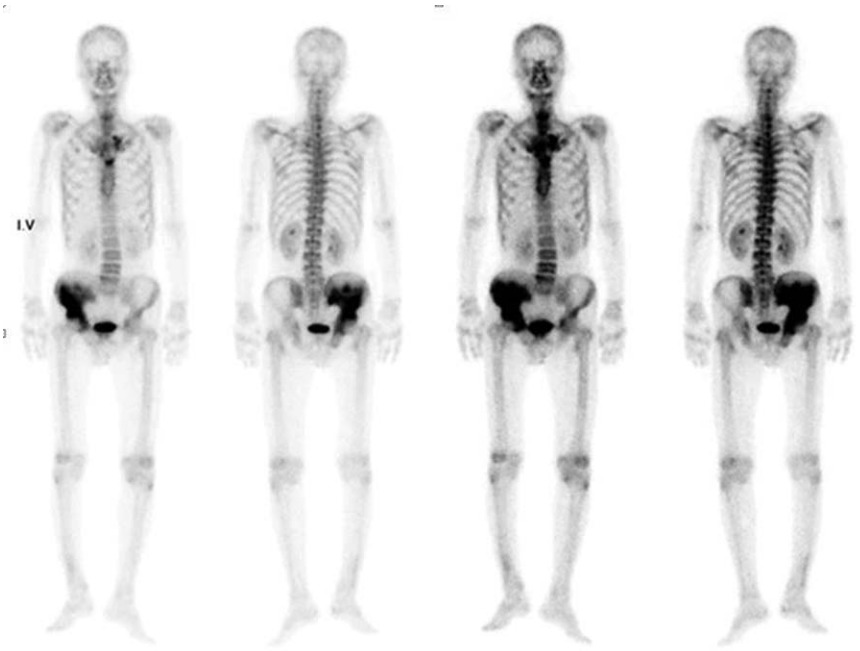

Figure 5. Bone scintigraphy demonstrated increased tracer uptake in the right hip joint and manubrium and sternoclavicular joints.

SAPHO syndrome remain a challenge. There are several published diagnostic criteria for SAPHO and the presence of only one of these inclusion criteria is sufficient to make the diagnosis. With regard to all of them, it can be said that the criteria, made initially by Kahn and modified in 2003, seem to be the most precise when used all together.[13] Despite these efforts to correctly diagnose SAPHO syndrome, this syndrome could be a real diagnostic challenge. Aljuhani et al[14] explained the frequent involvement of soft tissues around inflamed bone in patients with SAPHO syndrome, with the consequent diagnostic difficulties. Boutin and Resnick[15] also demonstrated that the differentiation of SAPHO syndrome from other diseases that produce similar radiographical findings, but have different prognoses and treatments, such as osteomyelitis, Ewing sarcoma, metastasis, and Paget disease of bone could be difficult.

Recently, there has been increasing evidence of the medication used in the treatment of SAPHO syndrome, which demonstrates a marked improvement in the clinical picture of this syndrome.[16–19] As such, it is a good therapeutic strategy to delay disease progression or control pain caused by SAPHO syndrome with medication or physical therapy in the early stage of this disease. Unfortunately, our patient was not correctly diagnosed as SAPHO syndrome in the early stages, which also led to inadequate therapy. The clues for the diagnosis of our patient stemmed from systemic examination, radiological examination, and bone scintigraphy, which has been reported to be a sensitive and accurate early diagnostic test for bone lesions of SAPHO syndrome.[20,21] It had been reported that the hip joint is not usually involved in SAPHO syndrome.[3,7] Our patient had severe right hip pain associated with limited range of motion, and imaging studies demonstrated joint obliteration with severe arthritic change and myositis around the hip joint. Through searching for references in the literature regarding how best to manage our patient, very little information was available to guide us regarding the adequate treatment of this patient with SAPHO syndrome affecting the hip joint. O'Connor et al reported that a case of a young female presenting with right hip pain.[22] The patient was initially treated as septic arthritis, but there was no response to antibiotic treatment. Further clinical and radiological investigation showed signs of SAPHO syndrome. The patient subsequently settled on conservative management and made a full recovery. Contrary to this report, the duration of right hip pain of our patient was around 3 years, and imaging studies demonstrated that the hip joint was obliterated with multiple osteophyte and cyst formations, which makes for a good candidate for joint replacement surgery.[23] Vavrík et al reported a case of SAPHO syndrome affecting the knee and hip joint simultaneously.[24] The patient was treated with knee synovectomy and primary THA. The reference was not written in English and we could not find any further follow-up result about this surgical therapy. Despite all these efforts, unfortunately, we could not find any reports about therapeutic references for severely damaged hip joint caused by SAPHO syndrome, for which THA was indicated. Currently THA is regarded as a safe treatment option for advanced degenerative hip joint disease. Moreover, other inflammatory diseases affecting the hip joint have been well treated with THA in severe cases. For the treatment of pigmented villonodular synovitis involving the hip joint, synovectomy is generally accepted as the most appropriate surgical option; however, in cases demonstrating end-stage joint destruction, THA combined with open synovectomy is frequently chosen.[25–29] Although the etiology of SAPHO syndrome is still unknown, 1 hypothesis is that SAPHO syndrome is related to seronegative spondyloarthropathies, especially psoriatic arthritis.[30,31] THA is an accepted treatment in patients with severe and painful deformities, caused by psoriatic arthritis. As such, we opted for THA for the condition of our patient, whose hip was severely damaged by SAPHO syndrome.

In spite of a negative result of Gram stain and culture through open surgical debridement at previous hospital and an imaging study suggesting SAPHO syndrome, we could not assume that the cause of his right hip pathology was definitely not related with infectious condition because of disabling motion-related hip pain and elevated inflammatory serological markers. It is also worth recalling that SAPHO syndrome is probably a primitive reactive osteitis in genetically predisposed subjects and that *Propionibacterium acnes*, *Staphylococcus aureus*, and other germs have been isolated from osteoarticular lesions in the anterior chest wall, spine, pustules, and synovial fluid tissue.[32] Based on recent reports, culture-negative joint fluid specimens cannot definitively rule out septic arthritis. Slinger et al[33] detected *Kingella kingae* with culture-negative septic arthritis. Berbari et al[34] reported that culture-negative periprosthetic joint infection compromised 7% in 897 episodes of periprosthetic joint infection during their study period. Stirling et al[35] also reported a false-negative rate of Gram-stain microscopy for septic arthritis of 78%. Apart from those reports, it is well known that prior antimicrobial therapy is associated with an increased risk of negative cultures among patients with periprosthetic joint infections.[34,36] Our patient received prolonged antibiotic treatment prior to visiting our hospital, as such, it was safer for us not to exclude the possibility of culture-negative infectious arthritis involving hip joint. When it comes to treating infectious hip joint disease, 2-stage THA has been claimed as the gold standard and the treatment of choice, mostly in combination with spacers in the form of antibiotic loaded PMMA. To the best of our knowledge, this is the first article focusing on 2-stage THA for patients with advanced hip disease caused by SAPHO syndrome.

This article reveals the safety and effectiveness of 2-stage THA to treat destructive hip disease caused by SAPHO syndrome, mimicking infectious arthritis. Firstly, it was suitable for removing most necrotic and inflammatory tissues during open surgery. Secondly, it could rapidly relieve disabling hip pain induced by SAPHO syndrome due to the above procedures. Thirdly, the antibiotic-loaded cement spacer planted in the hip not only reserved the length and motion of the hip, but also helped to eradicate possible undetected microorganisms in our patient with normalized CRP and ESR within 6 weeks of the first operation.[37,38] Lastly, specimens obtained in the operation for pathological examination and biopsy culture can assist in definitively ruling out infectious arthritis.

4. Conclusions

Owing to the recent introduction of new medications for managing this syndrome, it is really important to recognize SAPHO syndrome promptly in order to avoid inadequate therapies and to delay progression to joint destruction. In spite of increasing awareness and improving medical therapies of SAPHO syndrome, we consider this report to be incredibly valuable because we have only found very few references to treatment of severely damaged hip joints caused by SAPHO syndrome in any national or international professional literature available. To the best of our knowledge, this is the first report describing 2-stage THA as a treatment for severely damaged hip joints complicated by delayed diagnosis and inadequate therapy

for SAPHO syndrome. Based on our study, considering the difficulties in differentiating noninfectious osteitis caused by SAPHO syndrome from other infectious osteitis involving hip joints, 2-stage THA was an effective and safe definitive management strategy for controlling severe hip pain associated with severe secondary osteoarthritis complicated by SAPHO syndrome. While 2-stage THA can be obviously recommended in cases like this, 2-stage THA should be considered unique and indicated only rarely after careful consideration of all circumstances. Future studies of long-term follow-up and a larger series of patients are required to evaluate the effectiveness of this technique for the treatment of SAPHO syndrome of the hip.

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