CASE REPORT

Tuberculosis of the foot mimicking Charcot arthropathy

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Mycobacterium tuberculosis bone and joint infection accounts for 2% to 3% of all tuberculosis cases but is uncommon in the foot. A 32-year-old woman had foot pain and swelling, and radiographs showed midfoot bony destruction and fragmentation. She was diagnosed with Charcot arthropathy, but had no neuropathy or improvement despite total contact casting. Bone biopsy 16 months after initial presentation did not show acid-fast bacilli on smear, but *M. tuberculosis* was recovered on culture; concurrent chest radiographs showed patchy and nodular opacities in both upper lung zones, consistent with previous pulmonary tuberculosis. Sputum smear showed acid-fast bacilli and culture yielded *M. tuberculosis*. In retrospect, the patient was at increased risk for *M. tuberculosis* infection because of previous residence in Myanmar and India. Clinicians should consider *M. tuberculosis* infection in the differential diagnosis of Charcot arthropathy for patients who have exposure history and absence of risk factors for Charcot arthropathy.

KEY WORDS: infection, neuropathy, mycobacterium, diagnosis

L'infection osseuse et articulaire à *Mycobacterium tuberculosis* représente de 2 % à 3 % de tous les cas de tuberculose, mais est peu courante dans le pied. Une femme de 32 ans présentait des douleurs et un œdème au pied. Les radiographies ont révélé une destruction et une fragmentation osseuses sur la partie médiane du pied. Elle a reçu un diagnostic d'arthropathie de Charcot, mais ne souffrait pas de neuropathie et ne constatait pas d'amélioration, malgré un plâtre de contact total. Seize mois après la consultation initiale, la biopsie osseuse n'a pas démontré de bacilles acido-alcoolo-résistants au frottis, mais la culture a dévoilé la présence de *M. tuberculosis*. Des radiographies pulmonaires effectuées simultanément ont montré des opacités éparses et nodulaires dans les deux zones pulmonaires supérieures, correspondant à une tuberculose pulmonaire antérieure. L'analyse des crachats a fait ressortir des bacilles acido-alcoolo-résistants, et la mise en culture, un *M. tuberculosis*. En rétrospective, la patiente était plus vulnérable à l'infection à *M. tuberculosis* parce qu'elle avait déjà habité au Myanmar et en Inde. Les cliniciens devraient envisager une infection à *M. tuberculosis* dans le diagnostic différentiel de l'arthroplastie de Charcot chez les patients qui y ont déjà été exposés et qui n'ont pas de facteurs de risque d'une telle arthropathie.

MOTS CLÉS : infection, neuropathie, mycobactérie, diagnostic

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INTRODUCTION

In 2015, there were 10.4 million incident cases of tuberculosis worldwide (1). In the United States, extrapulmonary tuberculosis accounted for 18.7% of all reported tuberculosis cases from 1993 to 2006 (2). In 2010 in Canada, 24.7% of tuberculosis cases diagnosed were nonrespiratory (3). In Canada and the United States, extrapulmonary tuberculosis is more common in people born overseas (2,3).

Bone and joint involvement occurs in 10% of extrapulmonary tuberculosis cases (2% to 3% of all tuberculosis cases), usually from hematogenous spread of *Mycobacterium tuberculosis*, lymphatic spread, or a contiguous focus of

infection (4). Spinal tuberculosis occurs in 50% of patients who have osteoarticular tuberculosis, and foot involvement is rare (4,5). In 220 cases of musculoskeletal tuberculosis in Los Angeles County, infection of the foot and ankle occurred in 5% of patients (4). In 194 cases of musculoskeletal tuberculosis in India, only 15 patients (8%) had involvement of the foot and ankle (6). Published reports of foot and ankle tuberculosis typically originate from investigators in high-incidence countries, including those in the Indian subcontinent (7). The calcaneus, midtarsal joints, and ankle joint may be the most common bones and joints involved in tuberculosis of the foot and ankle, but infection also may occur in the metatarsals and phalanges, and multiple bones may be involved simultaneously (8–12).

The typical symptoms and signs of osteoarticular tuberculosis of the foot and ankle are nonspecific (8,9,11,13). We treated a patient who was an immigrant to Canada from Myanmar who had midtarsal osteoarticular tuberculosis that initially was diagnosed as Charcot arthropathy. The purpose of this article is to increase awareness in health care practitioners about the potential for diagnostic difficulty that may delay curative treatment.

CASE PRESENTATION

A 32-year-old woman was evaluated at a community hospital orthopaedic surgery clinic because of a 2-year history of pain and swelling in the left foot. The symptoms started after she fell at work at a restaurant and injured the foot. Past medical history was noncontributory, and there was no documented history of any systemic or respiratory symptoms. She was born in Myanmar, lived in a refugee camp in India for 2 years, and had immigrated to Canada 9 years before evaluation; no immigration chest radiograph was available, and immigration screening did not include a tuberculin skin test. Physical examination of the left foot showed swelling, warmth, and erythema. Left foot radiographs showed midtarsal and talonavicular destruction, suggestive of Charcot arthropathy (Figure 1). She received the diagnosis of Charcot arthropathy and was treated with total contact casting for 3 months and a removable walker boot. Radiographs at 3 months after presentation showed erosive changes involving the navicular, cuneiform, and cuboid bones.

The patient was referred for a second opinion to our tertiary care clinic that specialized in diabetic foot wounds and neuropathic problems. Physical examination showed diffuse global swelling of the whole foot and tenderness of the midtarsal region. Sensory examination of the left foot with a 10 gram monofilament was normal. Based on the clinical and radiographic findings and diagnosis of Charcot arthropathy previously made, continued use of the removable walker boot was recommended. At follow-up 8 months after initial presentation, there was residual left foot pain, but the increased warmth and swelling had resolved, the foot was clinically stable, and radiographs showed ongoing midfoot bony fragmentation consistent with Charcot arthropathy but no new bone destruction.

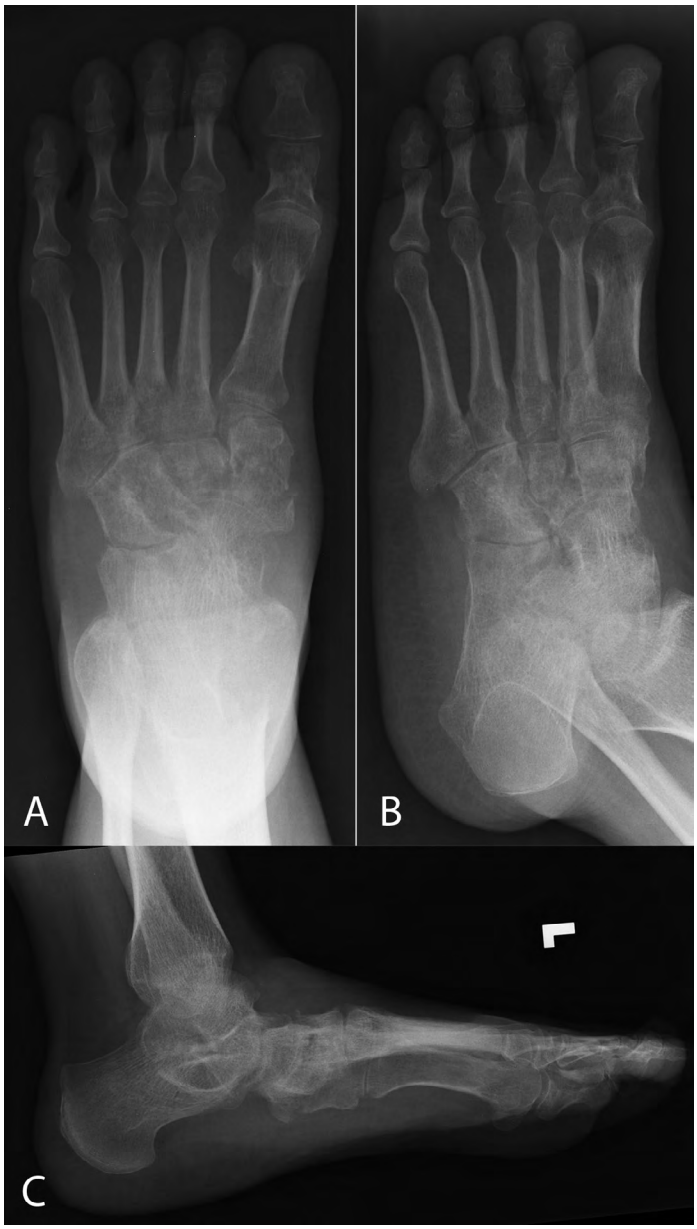

Figure 1: A 32-year-old woman who had a 2-year history of pain and swelling in the left foot that developed after a fall at work. Initial left foot (A) anteroposterior, (B) oblique, and (C) lateral radiographs showed soft tissue swelling at the midfoot, osteopenia, degenerative changes at Lisfranc and Chopart joints, fracture of the navicular and cuneiforms, and loss of the bony arch

The patient was prescribed orthopaedic footwear with custom moulded orthotic insoles.

During the subsequent 5 months, the patient had worsening left foot pain and swelling that necessitated use of crutches for walking. Plain radiographs and computed tomography scan at 14 months after initial presentation showed progressive erosive and destructive changes throughout the midfoot, collapse of the bony arch, and soft tissue swelling (Figure 2). Total contact casting was resumed but did not result in any clinical or radiographic improvement. Further diagnostic evaluation was performed because the patient had no evidence of peripheral neuropathy, diabetes mellitus, or other conditions associated with Charcot arthropathy. Tuberculin skin test was performed because the patient previously resided in a region endemic for tuberculosis, and was positive (reaction, 18 mm). The acid-fast smear of a calcaneocuboid bone biopsy at 16 months after initial presentation did not show any microorganism, but *M. tuberculosis* was recovered on culture. Chest radiographs at 17 months after presentation showed patchy and nodular opacities in both upper lung zones, consistent with scarring from previous pulmonary tuberculosis (Figure 3). Acid-fast bacilli were visualized on a sputum sample, and *M. tuberculosis*

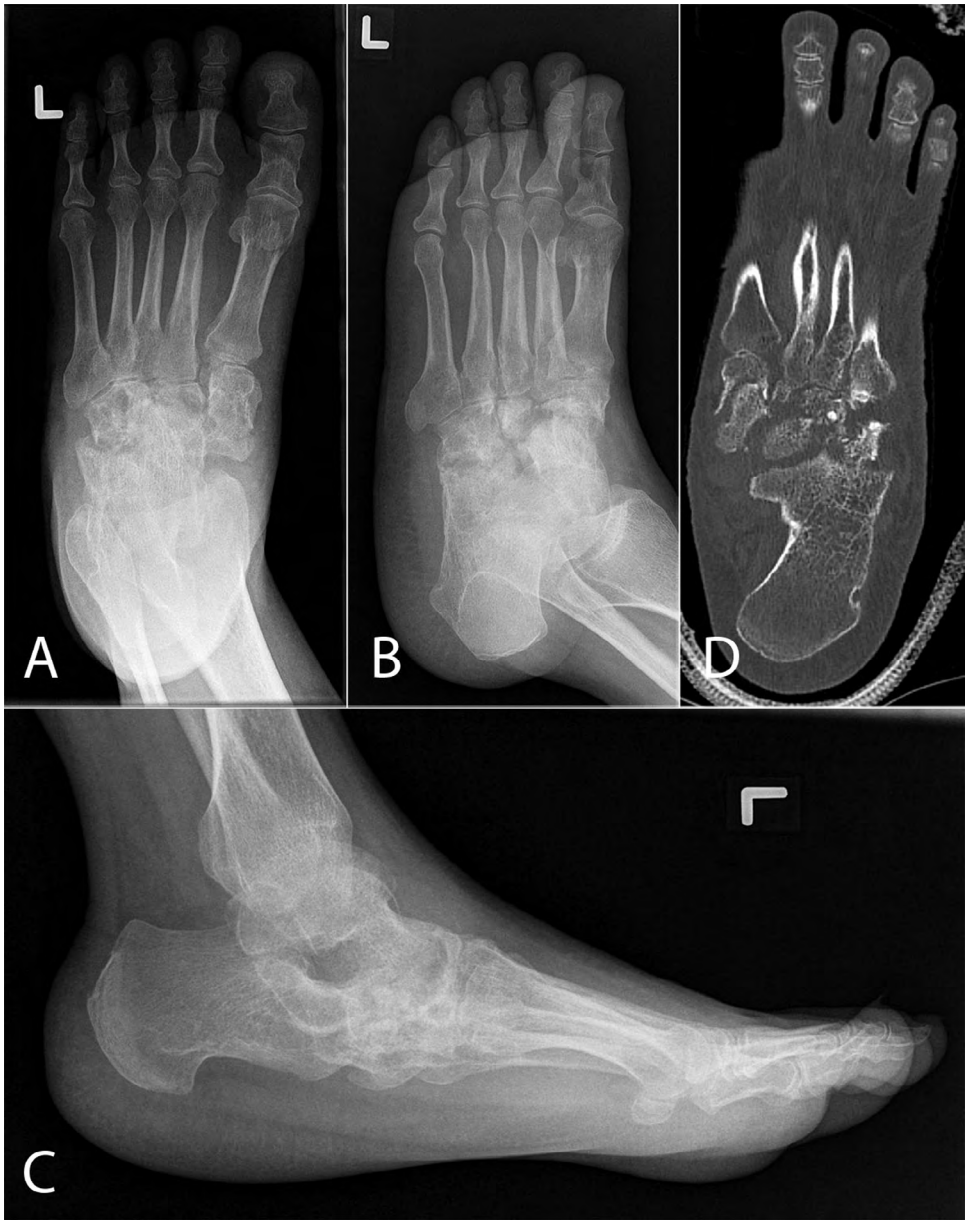

Figure 2: Left foot radiographs (A, B, C) and computed tomography (D) at 14 months after presentation showed marked fragmentation of the cuneiforms, cuboid, navicular, and talar head, midfoot collapse, and soft tissue swelling

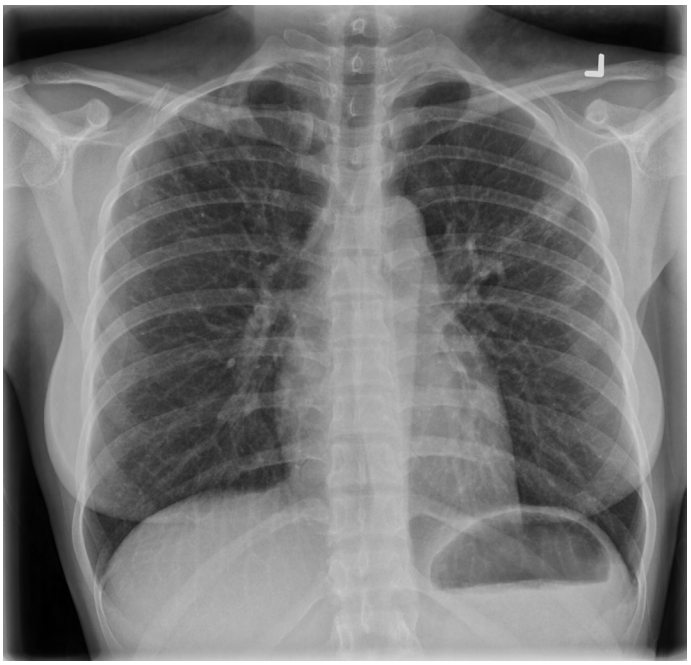

Figure 3: Chest radiograph at 17 months after presentation showing patchy airspace and nodular opacities in both upper lung zones, right greater than left, consistent with previous granulomatous infection such as tuberculosis

was recovered on sputum culture. Subsequent treatment included isoniazid, rifampin, pyrazinamide, and ethambutol which lead to a gradual decrease of edema and pain.

DISCUSSION

The patient had midtarsal osteoarticular tuberculosis as a result of reactivation of previous pulmonary tuberculosis. The foot problem initially was misdiagnosed as Charcot arthropathy because of the bony destruction noted on radiography and nonspecific clinical signs. Contributing factors to the delay in diagnosis of midtarsal tuberculosis included the presenting diagnosis of Charcot arthropathy by an orthopaedic surgeon, midtarsal bony destruction on radiographs similar to that observed with Charcot arthropathy, absence of known history of previous pulmonary tuberculosis, and rarity of osteoarticular foot and ankle tuberculosis, especially in Canada (4,6). In retrospect, the absence of neuropathy on monofilament testing may have raised suspicion that the patient had a condition other than Charcot arthropathy, which typically occurs in neuropathic patients (14,15).

Diagnosis of osteoarticular tuberculosis of the foot may be difficult, and delay in diagnosis is common. In 3 previous studies, the duration of symptoms before diagnosis ranged from 12 to 23 months (11,16,17). The present patient had signs and symptoms that were nonspecific for osteoarticular tuberculosis, and she did not have clinical signs of tuberculosis at more common anatomic sites such as the lungs or spine. Signs of osteoarticular tuberculosis of the foot may include joint swelling, limited range of motion, bony tenderness, muscle spasms, and limping, and patients may present with a cold abscess, draining sinus, or chronic ulcer (8,9,11,13). Systemic symptoms such as fever and night sweats may or may not be present; in previous reports, only 5 of 29 patients who had ankle tuberculosis (17%) had fever (16), and only 33 of 74 patients (45%) who had tuberculosis of the ankle and foot had systemic symptoms, mostly mild (9). Laboratory investigations typically reveal an elevated erythrocyte sedimentation rate (9,11). Tuberculosis of the foot and ankle may mimic other acute and chronic medical conditions including pyogenic osteomyelitis, inflammatory arthritis, osteochondrosis, and cancer (13).

In Canada in 2010, only 7% of patients with osseous tuberculosis had concomitant active pulmonary tuberculosis (3). Furthermore, tuberculosis of the foot is a paucibacillary infection, and yield of *M. tuberculosis* recovery on culture may be low (8,11,16,17). Histopathologic examination of tissue obtained at biopsy may be useful in supporting the diagnosis (11).

Charcot arthropathy of the foot and ankle is a deforming and destructive noninfectious inflammatory process (15,18,19). It most commonly occurs as a complication of diabetes mellitus or leprosy, but it also has been associated with other medical conditions including tertiary syphilis, toxic exposure, syringomyelia, poliomyelitis, rheumatoid arthritis, multiple sclerosis, congenital neuropathy, and traumatic injury (15,18). The pathogenesis of Charcot arthropathy is incompletely understood, but neurovascular compromise and neurotraumatic injury are contributing factors (15,18,19). Patients with Charcot arthropathy typically present with redness, warmth, and swelling of the foot and ankle, similar to infection (18,19). Early radiographs may have no bony changes, and bone and joint irregularity and instability may be noted within several weeks of symptom onset (14,15). There were 2 previously reported patients who had tuberculosis of the foot in which the diagnosis of Charcot arthropathy was considered initially, but in contrast with the present patient, both previous patients had diabetes (8,20).

The present patient illustrates the difficulty in diagnosing tuberculosis of the foot in countries where this clinical entity is encountered rarely. The absence of major risk factors for Charcot arthropathy such as peripheral neuropathy and diabetes mellitus, and the presence of preserved protective sensation to the left foot were signs that the initial diagnosis was incorrect. The history of prior residence in Myanmar and India further supported consideration of tuberculosis in the differential diagnosis (7). Although *M. tuberculosis* infection of the foot is uncommon, clinicians should consider this in the differential diagnosis of Charcot arthropathy for patients who have a relevant exposure history.

ACKNOWLEDGEMENTS: The authors thank Dr Martha Ainslie for her helpful comments.

CONTRIBUTORS: Conceptualization, SA, JME; Methodology, SA, AW, BP, RB, ET, JME; Investigation, SA, AW, BP, RB, JME; Writing – Original Draft, SA, JME; Writing – Review & Editing, SA, AW, BP, RB, ET, JME; Resources, AW, BP, RB, JME; Supervision, AW, BP, RB, ET, JME.

FUNDING: No funding was received for this work.

DISCLOSURES: The authors of have nothing to disclose.

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