INTRODUCTION

Brucellosis, a zoonosis with a worldwide distribution, is a systemic infection caused by facultative intracellular bacteria of the genus *Brucella*. *Brucella* species are gram-negative bacilli that are transmitted by direct contact with infected animals or by the consumption of products from infected animals. The disease is a major public health problem in the Mediterranean region, the Middle East, and Latin America but is rare in Korea. However, the incidence of Brucellosis is on the increase in Korea. It may affect various body organs and systems including the musculoskeletal organ and the reticuloendothelial system. Osteoarticular manifestations are the most frequent and severe complications, but it is difficult to diagnose because its clinical symptoms are variable and non-specific. It should therefore be included in the differential diagnosis of back pain. We describe three cases of brucellar spondylitis successfully treated by medical and surgical therapy.

KEY WORDS: Brucellosis · Spondylitis.

CASE REPORT

Case 1
A 67-year-old male cattle farmer presented with increasing lower back pain and the left leg pain for 3 months prior. His pain was unresponsive to rest and pain killers. Also, he complained of night sweating. He had a history of contact with a *Brucella*-infected cow (delivery of her calf) a few months prior. A general physical examination was normal except for tenderness in the lower back area. Neurologically, he had paresthesia in L4,5 dermatomes of the left leg. Laboratory studies revealed an erythrocyte sedimentation rate (ESR) of 20 mm/hr, and a C-reactive protein (CRP) level of 16.6 mg/dL. The lumbar spine MRI showed osteomyelitis of L4 vertebral body with a prevertebral abscess (Fig. 1). We performed a percutaneous biopsy and attempted microbiological culture of the abscess lesion but the result was negative. He was transferred to another hospital and the diagnosis of brucellosis was confirmed by a positive blood culture for *B. abortus*. He underwent operation to remove the abscess and antibiotics (streptomycin, doxycycline) were administered. His symptoms improved thereafter.
Case 2
A 66-year-old male cattle farmer presented with high fever, nausea, vomiting, and lower back pain. He had a history of contact with a Brucella-infected cow a few months prior. On physical and neurological examination, his body temperature was 37.8°C and lumbar spinal movements were restricted and painful. Routine laboratory tests revealed an erythrocyte sedimentation rate (ESR) of 126 mm/hr, C-reactive protein (CRP) of 52.6 mg/dL, and white blood cell count of 5230/µL with 58.3% neutrophils and 31.2% lymphocytes. A standard tube agglutinin test, which measures serum immunoglobulin G levels against Brucella antigen, was positive at a titer of 1/1140. Lumbar spine magnetic resonance image (MRI) revealed osteomyelitis of T12, L1 vertebral body with a small epidural abscess (Fig. 2). The patient was treated with doxycyclin combined with rifampin for 2 months. Three weeks after starting antibiotics, his ESR and CRP fell to 46 mm/hr and 2.8 mg/dL, respectively. The patient's back pain was progressively reduced during the course of medical treatment.

Case 3
A 60-year-old male farmer visited our hospital because of neck pain and mild numbness in both arms for 2 weeks. He had no other general problems or fever. No neurological deficits other than mild numbness in both arms were revealed by a neurological examination. Cervical spine MRI revealed C5-6 cervical intervertebral disc herniation (Fig. 3), and therefore an operation (corpectomy with anterior interbody fusion at the level of C5-6) was performed. During the operation, pus was found, and the infective spondylitis was diagnosed. Laboratory studies revealed an erythrocyte sedimentation rate (ESR) of 79 mm/hr, and C-reactive protein (CRP) of 138 mg/dL. After a few weeks, Brucellosis was diagnosed with a positive culture of the pus obtained during the operation and a positive standard tube agglutinin test (a titer of 1/1035). He was started on doxycyclin and his symptoms improved.

DISCUSSION
Brucella species are small gram-negative bacilli that are transmitted to humans either by the consumption of unpasteurized milk or other products from infected animals or by direct contact with infected animals8-10). Symptoms are non-specific and can include fever, headache, back pain, myalgias, and fatigue5,12). Because of the non-specific symptoms of this disease and difficulty in distinguishing this disease from other infectious spondylitis diseases on MRI, suspicious patients with a history of direct contact with infected animals or consumption of their products is important for early diagnosis and treatment1,13). Brucellosis may affect various body organs, but spondylitis is the most frequent and significant complication of brucellosis and the reported incidence varies from 2%-60%1,5,10,12). Lumbar vertebrae are the most frequently involved regions followed by thoracic and cervical segments1,3,10). Brucella species that cause human brucellosis are B.melitensis, B.abortus, B.suis, and B.canis1,5). B.abortus is the most common in Korea4). Definite diagnosis of brucellosis is established by clinical manifestations and the isolation of Brucella species from blood or bone marrow cultures1,5,9). In the absence of bacteriologic confirmation, a positive serology for Brucella (titer over 1 : 160 in a standard tube agglutination test or a 4-fold increase in the Brucella-antibody titer) is needed for definite diagnosis1,5,7). Elevated ESR is found in most cases and is a useful measure for assessing response to therapy1). MRI plays an important role in the diagnosis, assessment, and management of patient with brucellar spondylitis. The lesion may be unilocal or multifocal on MRI14). This disease has a predilection for the lower lumbar spine, and intact vertebral architecture and diffuse vertebral osteomyelitis, disc space involvement, minimal paraspinous soft tissue involvement, and absence of gibbus deformity are features that suggest brucellar spondylitis over other pyogenic spondylitis and Tuberculous spondylitis11,14). There is no
standard recommended treatment regimen and various combinations of antibiotics can be used to treat spinal brucellosis, however SDR combination therapy (streptomycin +doxycyclin +rifampin ➔1 g/day intramuscularly for 15 days +100 × 2 mg/day per oral for 45 days +15 mg/kg (600-900 mg/day) × 1 per oral for 45 days) is the most effective regimen for reducing failure and relapse rates in brucellar spondylitis.\(^2,13\)

**CONCLUSION**

Brucellar spondylitis should be included in the differential diagnosis of back pain. It is difficult to diagnose because its symptoms and signs are non-specific. Therefore, MRI, blood cultures, tissue biopsy and cultures are recommended in suspected cases.

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