

Lumbar Actinomycosis: A Case Report¹

Min Hee Lee, M.D., Jang Gyu Cha, M.D., Eun Ju Choo, M.D.², Kyeong Cheon Jung, M.D.³,
Jai Soung Park, M.D., Sung-Il Park, M.D., Sang Hyun Paik, M.D., Hae Kyung Lee, M.D.

Spinal actinomycosis is a rare infection that usually develops from contagious spreading of the causative organism. Diagnosing this malady may be delayed due to the nonspecific radiological findings and the slow progression of the disease. We present here the case of a 51-year-old male with slowly progressing lower back pain and fever. Computed tomography (CT) and magnetic resonance (MR) imaging revealed a paraspinal mass and cortical destructive change in the L1 vertebra, but the disk space was spared. A surgical biopsy confirmed spinal actinomycosis. We describe the CT and MR imaging findings of this patient and we also review the related literature to highlight this uncommon disease entity.

Index words : Actinomycosis

Tomography, X-ray computed
Magnetic resonance (MR)
Spine
Infection

Actinomycetes are normal commensal microflora that live in the mouth, gut and female genitalia. Actinomycetes are gram-positive filamentous bacteria rather than fungi, as is sometimes assumed (1). The first case of actinomycosis in a human was reported by Lebert in 1857 (1). Despite the frequency of actinomycosis, spinal actinomycosis is rarely encountered. In this report we describe the computed tomography (CT) and magnetic resonance (MR) imaging findings of a patient who suffered from spinal actinomycosis along with a paraspinal abscess.

Case Report

A 51-year-old male presented with a 6-week history of back pain, fever, night sweats and weight loss (10 kg). The lumbar and abdominal CT scans taken at an outpatient clinic prior to admission to our hospital showed an inflammatory lesion on the lumbar spine; the patient was subsequently referred to our hospital. He had no history of major surgery or trauma. Upon admission to the hospital, the physical examination resulted only in non-specific findings, except for tenderness at the right costovertebral angle (CVA). A complete blood cell count showed a white blood cell (WBC) count of 19,200/ μ L (85.6% neutrophils), a hemoglobin level of 9.0 mg/dL, a hematocrit of 29.1% and a platelet count of 746,000/ μ L; the erythrocyte sedimentation rate (ESR) was 84 mm/h. The creatinine level was 1.0 mg/dL and the alkaline phosphatase level was 123 IU/L (normal: < 119 IU/L).

¹Department of Radiology, Soonchunhyang University Bucheon Hospital, Korea.

²Department of Internal Medicine, Infectious Diseases, Soonchunhyang University Bucheon Hospital, Korea.

³Department of Pathology, Seoul National University Hospital, Korea
Received August 8, 2008 ; Accepted September 30, 2008

Address reprint requests to : Jang Gyu Cha, M.D., Department of Radiology, Soonchunhyang University Bucheon Hospital, 1174, Jungdong, Wonmi-gu, Gyeonggi-do 420-021, Korea.

Tel. 82-32-621-5851 Fax. 82-32-621-5874 E-mail: mj4907@schbc.ac.kr

The radiography of the lumbar spine was normal. The spinal CT from the outpatient clinic showed cortical erosion in the right lateral margin of the L1 vertebral body (Fig. 1A). A contrast-enhanced abdominal CT scan showed the paraspinal mass as homogenous enhancement in the bulging psoas muscle tissue at the level of L1 (Fig. 1B). The mass crossed the perirenal fascia and extended to the posterior aspect of the renal capsule. A 99mTc-DPD bone scan revealed intense uptake in the right lateral side of L1 (Fig. 2). MR imaging was performed with a GE 1.5T Signa MR scanner. The T1-weighted images revealed a low to intermediate signal intensity lesion in the paraspinal mass (Fig. 3A). The T2-weighted images showed high signal intensity in the medial half of the mass and low signal intensity in the lateral half of the mass, and irregular thickening was depicted in the right perirenal fascia extending to the posterior renal capsule (Fig. 3B). The contrast-enhanced T1-weighted images showed relatively homogeneous enhancement, but the medial part of the mass showed decreased enhancement (Fig. 3C). The coronal T2 weighted images demonstrated an elongated paraspinal abscess along the psoas muscle and a high signal intensity lesion on the right lateral side of L1 that spared the intervertebral space (Fig. 3D).

The initial differential diagnosis included tuberculous spondylitis, pyogenic spondylitis, fungal infection and lymphoma based on the involvement of the spine and psoas muscle.

The patient underwent a bone marrow biopsy for assessing the possibility of lymphoma or another hematological disease, but the biopsy was negative for malignant cells. Several trials of needle biopsy and aspiration

failed to document a pathogen. A surgical biopsy was performed, and the specimens were obtained from the paraspinal mass around the L1 vertebral body. Microscopic analysis confirmed the presence of actinomycosis, which showed the radiating filaments of actinomyces surrounded by an infiltration of inflammatory cells and granulation tissue (Fig. 4).

Discussion

Actinomycosis is an uncommon disease caused by the *Actinomyces* species, which are gram-positive anaerobic bacteria that are normal inhabitants of the oral cavity and the respiratory and digestive tracts (2). Among these species, *A. israelii* is the predominant human pathogen. In tissues, the bacteria aggregate into microcolonies and they grow in a radial configuration, with the peripheral layer of organisms having club-shaped ends (3). These microcolonies form characteristic sulfur



Fig. 2. The 99mTc-DPD bone scan revealed intense uptake in the right lateral side of L1.

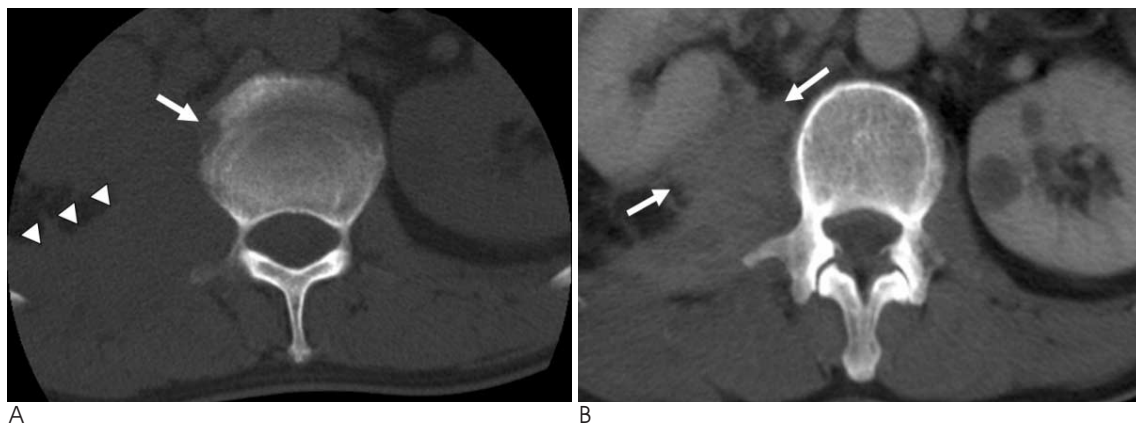


Fig. 1. A. The lumbar spine CT showing the right paraspinal mass lesion (arrow heads) with marginal erosion of the L1 vertebral body (arrow). B. The contrast-enhanced CT scan showing a bulky mass with relatively homogenous enhancement that crosses the posterior pararenal fascia and extends to the renal cortex (arrows).

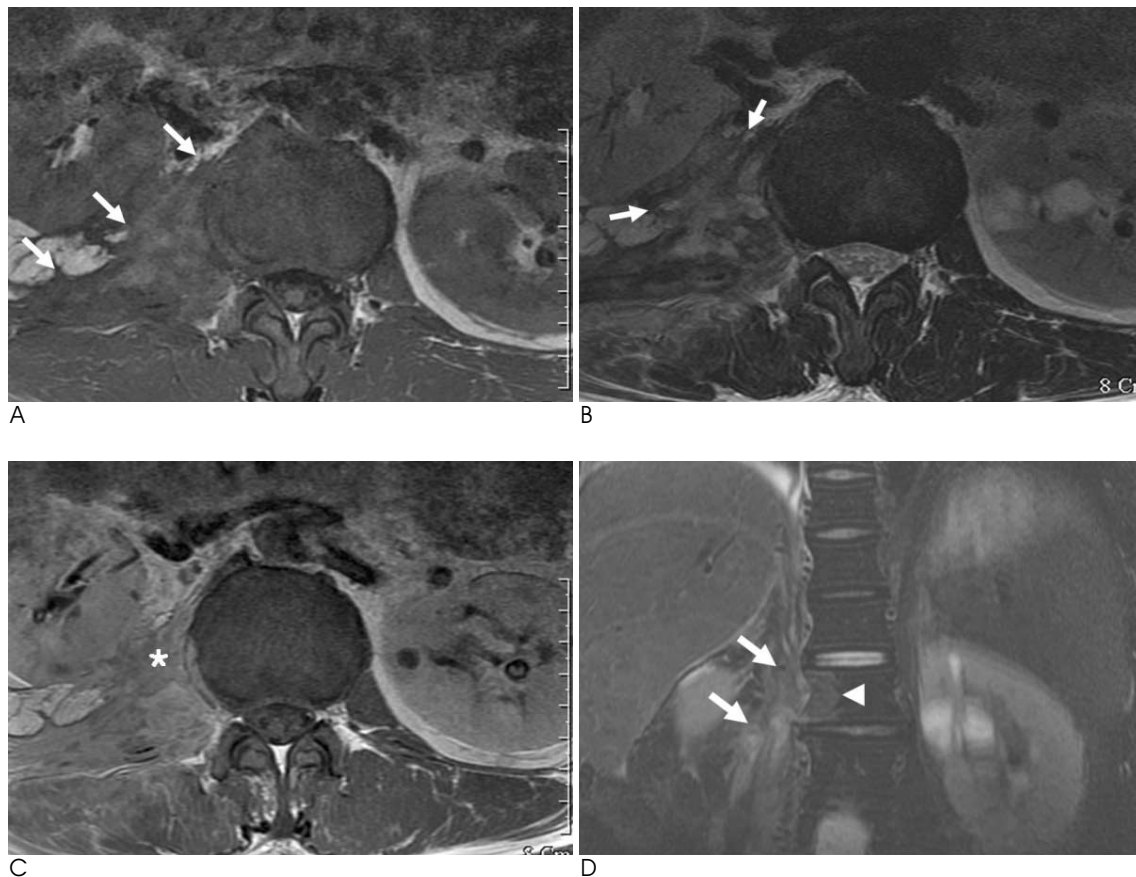


Fig. 3. A. The axial T1-weighted image (TR/TE,666/9) showing a paraspinal mass (arrows) with low signal intensity surrounding the right paravertebral margin of L1.
 B. The axial T2-weighted image (TR/TE,4000/116) showing a high signal intensity in the medial portion and low signal intensity in the lateral portion of the paraspinal abscess on the T2-weighted images; irregular thickening of the right perirenal fascia (arrows) is depicted and this extends to the posterior renal capsule.
 C. The contrast-enhanced axial T1-weighted image (TR/TE,600/9) reveals a homogeneously enhanced paraspinal mass, including an area of slightly decreased enhancement where the lesion shows high signal intensity on a T2 weighted image (asterisk).
 D. The coronal T2 weighted image (TR/TE,4000/120) demonstrates an elongated paraspinal abscess along the psoas muscle (arrows) and a high signal intensity lesion (arrowhead) on the right lateral side of L1, and this lesion spares the intervertebral space.

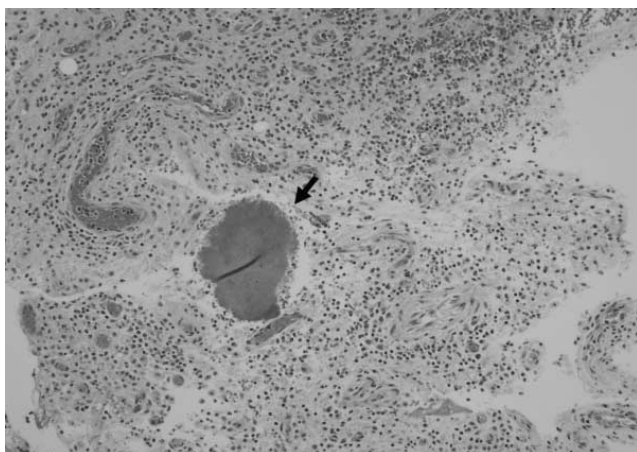


Fig. 4. The histopathological specimen showing the radiating filaments of actinomycetes surrounded by an infiltration of inflammatory cells and granulation tissue (arrows). Hematoxylin and eosin stain, original magnification: $\times 200$.

granules. The disease can spread to the surrounding tissues and it will infrequently disseminate hematogenously, giving rise to distant septic metastases (4). The infection can also reach and cross the diaphragm by direct invasion. The cervicofacial, thoracic and abdominal regions are the usual sites of involvement (3, 5). Cervicofacial actinomycosis is the most common form of clinical manifestation. Spinal actinomycosis is unusual and it makes up less than 5% of all the infected sites (6).

Although the radiological findings are not specific, actinomycosis can show some distinct features that stand in contrast to other pyogenic infections. Actinomycosis shows destructive changes and this causes the affected bones to have the radiographic appearance of saw-toothed borders and a honey-combed archi-

ture, and the disease progresses slowly (6, 7). Previous reports have also indicated that spinal actinomycosis has the tendency to spare the intervertebral disc space (6, 7). As this case illustrates, although the inflammatory lesion involved nearly half of the circumference of the vertebral body, no signal change in the intervertebral discs was seen on the MR images.

The infection in the present case contiguously extended to the renal capsule, crossing posterior to the pararenal fascia. This infiltrative nature has been previously described in the cervicofacial and abdominopelvic regions (2, 5) and this infiltrative nature may be due to the proteolytic enzymes of the organism (5).

Actinomycosis appears as a solid mass with moderate, relatively homogeneous enhancement on CT imaging (5, 8), and the T1- and T2-weighted MR images show an intermediate signal intensity associated with moderate contrast enhancement (2). These CT and MR imaging characteristics may reflect the histological features of abundant granulation and fibrous tissue in the sites infected with actinomycosis (2, 5) and this may be related to the chronic course of the disease, which results from the delayed diagnosis and treatment and the frequent misinterpretation of findings as evidence of malignant disease (5). The paraspinal abscess in our study mainly showed homogenous enhancement, but it also revealed small areas of decreased enhancement on the contrast-enhanced T1-weighted images, which may be attributed to suppurative necrosis (Fig. 3C) (2).

As in the present case, the radionuclide uptake on ^{99m}Tc MDP bone scans can represent the spinal involvement before obvious radiological changes have occurred (6).

Culturing actinomycosis is difficult because the bacteria are slow-growing, anaerobic microorganisms that proliferate in culture for less than 50% of all cases (3, 9); consequently, the diagnosis often relies on the histological identification of sulfur granules and gram-positive central filamentous bacteria in tissues (8).

The differential diagnosis for spinal actinomycosis includes tuberculous spondylitis, fungal infection and lymphoma. An initial diagnosis of tuberculosis in this case was made due to the history of slow disease progression and the involvement of the psoas muscle with destructive changes in a vertebral body, as seen on the CT and MR imaging. However, tuberculosis can be distinguished from actinomycosis because tuberculous ab-

cesses usually show well-demarcated marginal enhancement on the contrast enhanced CT or MR imaging and this involves the intervertebral spaces. Fungal infections also have the propensity to spare the intervertebral space, as in actinomycosis (10), but fungal infections usually occur in immunocompromised patients. Lymphoma shows homogeneous enhancement on the contrast-enhanced CT or MR imaging. Lymphoma can be distinguished from actinomycosis because lymphoma shows multiple sites of involvement and it is accompanied with lymphadenopathy. In contrast to lymphoma, actinomycosis usually does not spread via the lymphatic system because of the size of the bacterium; regional lymphadenopathy is uncommon or it develops late (9). No evidence of paravertebral lymphadenopathy was found in this case.

In summary, although the radiological findings of spinal actinomycosis are non-specific, actinomycosis should be considered in the differential diagnosis of a relatively homogeneously enhancing soft tissue mass that spares the intervertebral space and crosses the anatomical fascia on the CT or MR imaging.

References

1. Pritchard DJ. Granulomatous infections of bones and joints. *Orthop Clin North Am* 1975;6:1029-1047
2. Park JK, Lee HK, Ha HK, Choi HY, Choi CG. Cervicofacial actinomycosis: CT and MR imaging findings in seven patients. *AJNR Am J Neuroradiol* 2003;24:331-335
3. Brown JR. Human actinomycosis. A study of 181 subjects. *Hum Pathol* 1973;4:319-330
4. Brett MS. Advanced actinomycosis of the spine treated with penicillin and streptomycin; report of a case. *J Bone Joint Surg Br* 1951;33B:215-220
5. Ha HK, Lee HJ, Kim H, Ro HJ, Park YH, Cha SJ, et al. Abdominal actinomycosis: CT findings in 10 patients. *AJR Am J Roentgenol* 1993;161:791-794
6. Voisin L, Vittecoq O, Mejjad Om, Krzanowska C, Defives T, Cambon-Michot C, et al. Spinal abscess and spondylitis due to actinomycosis. *Spine* 1998;23:487-490
7. Young WB. Actinomycosis with involvement of the vertebral column: case report and review of the literature. *Clin Radiol* 1960;11:175-182
8. Allen HA, 3rd, Scatarige JC, Kim MH. Actinomycosis: CT findings in six patients. *AJR Am J Roentgenol* 1987;149:1255-1258
9. Bennhoff DF. Actinomycosis: diagnostic and therapeutic considerations and a review of 32 cases. *Laryngoscope* 1984;94:1198-1217
10. Williams RL, Fukui MB, Meltzer CC, Swarnkar A, Johnson DW, Welch W. Fungal spinal osteomyelitis in the immunocompromised patient: MR findings in three cases. *AJNR Am J Neuroradiol* 1999;20:381-385

요추 방선균증: 증례 보고¹

¹순천향대학교 의과대학 부천병원 영상의학과

²순천향대학교 의과대학 부천병원 감염내과

³서울대학교 의과대학 병리과

이민희 · 차장규 · 추은주² · 정경천³ · 박재성 · 박성일 · 백상현 · 이해경

방선균은 선형의 혐기성 그람양성균으로 농양, 조직섬유증 및 배농동 등을 형성하는 전신감염이나 국재성 화농성 감염을 유발하나 척추 감염은 매우 드물다. 이 질환은 비특이적인 방사선학적 소견과 느린 진행양상으로 인해 진단이 늦어질 수 있다. 저자들은 점진적으로 악화하는 하부요통과 발열을 주소로 내원한 51세 남자환자에서 시행된 전산화단층촬영과 자기공명영상에서 1번 요추 주위의 종괴와 추체 피질의 골파괴를 발견하였다. 조직학적 검사 결과 척추의 방선균증으로 확진된 1예를 경험하였기에 문헌 고찰과 함께 보고한다.