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Case Report

Spinal tuberculosis of the lumbar spine after percutaneous vertebral augmentation (vertebroplasty or kyphoplasty)

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Abstract

BACKGROUND CONTEXT: Spinal tuberculosis occurring after percutaneous vertebral augmentation has rarely been described. To date, only two such cases have been documented in the literature. Vertebral augmentation may reactivate a quiescent tuberculous lesion and promote the infective process in elderly patients with or without immunosuppression, thereby resulting in poor outcomes.

PURPOSE: The purposes of this study were to present two cases in which spinal tuberculosis occurred after vertebroplasty or kyphoplasty, to highlight the clinical features and need for early diagnosis of this pathology, and to postulate probable reasons for this association.

STUDY DESIGN: This study is based on a clinical case series and literature review.

METHODS: In this report, we review the clinical histories of two old women undergoing vertebral augmentation with subsequent spinal tuberculosis.

RESULTS: The first patient responded favorably to conservative treatment with multidrug antitubercular therapy and spinal braces. The second patient underwent surgical debridement through a posterior approach alone, without instrumentation, combined with adjuvant chemotherapy. By 1 year after treatment, both patients had experienced almost complete recovery and continued to be seen for follow-up visits.

CONCLUSIONS: Suspicion should be high, and magnetic resonance imaging is warranted in cases with deteriorating clinical symptoms and signs of acute infection after vertebral augmentation. We propose obtaining exhaustive microbiologic and histologic evidence via needle biopsy or open surgery in a timely fashion to establish an accurate diagnosis because tubercular spondylitis occurring in such a situation may progress rapidly.

Keywords: Spinal tuberculosis; *Mycobacterium tuberculosis*; Percutaneous vertebroplasty; Percutaneous kyphoplasty; Lumbar spine; Vertebral augmentation

Introduction

Percutaneous vertebral augmentation with transpedicular injection of bone cement, referred to as vertebroplasty or kyphoplasty, is now a well-established treatment for painful and osteoporotic compression fractures [1–3]. Although low complication rates are characteristic of vertebral augmentation, evidence suggests that percutaneous vertebroplasty and kyphoplasty can be associated with subsequent spinal infection [4–14]. Furthermore, several cases of osteomyelitis occurring at the site of injury have been reported [15–19]. However, spinal tuberculosis occurring

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after vertebral augmentation has been rarely described in the English language literature, with only two anecdotal cases documented to date [20,21].

Here, we report two patients with fulminant tuberculous spondylitis after lumbar vertebroplasty or kyphoplasty. We highlight the clinical features and need for early diagnosis of this pathology. We also postulate probable reasons for this association.

Case reports

Case 1

A previously healthy 68-year-old woman was admitted to our institution on February 2012 with a 3-month history of considerable pain in the lumbosacral region, without radiating leg pain. Ambulation aggravated the pain. She also complained of intermittent low-grade afternoon fever in the absence of night sweats, malaise, or weight loss. She had suffered a vertebral compression fracture because of trauma on November 2011 and underwent percutaneous vertebroplasty at the L2 level with an uneventful recovery (Fig. 1A–C). Initially, there was no evidence of active infection, including tuberculosis; therefore, the vertebral augmentation procedure was performed. A biopsy was performed during vertebroplasty, after the vertebral body had been accessed through the pedicle with the cannulas. The biopsy (Fig. 3A) and microbiologic analysis, including acid-fast bacilli culture of the specimen, failed to show any pathologic cause of the fracture.

She was afebrile on admission. Physical examination revealed light tenderness over the infected area with paravertebral muscle spasm, a positive straight leg–raising test and the Bragard sign in the right lower leg. Spinal movements were markedly restricted, but neurologic examination was largely negative. Examinations of her head, neck, and heart were normal. No rash or lymphadenopathy was found. An abdominal examination was normal, with no tenderness or hepatosplenomegaly. Laboratory studies revealed a white blood cell count of 5,900 per mm^3 with 76.8% neutrophils, erythrocyte sedimentation rate of 66.0 mm per hour, and C-reactive protein of 31.4 mg/dL. Tests for human immunodeficiency virus and hepatitis B virus were negative.

Magnetic resonance imaging (MRI) of the lumbosacral spine indicated severe spondylitis manifesting as abnormal signal changes at the L1–L2 level with bony destruction of L2 (Fig. 1D and E). These lesions had not been detected approximately 3 months previously during an MRI examination conducted for the vertebroplasty. However, this patient was not a candidate for surgery because computed tomography (CT) of the lung, performed after abnormal findings that were obtained on chest radiography, revealed exudations in the right middle and left superior lobes, suggesting acute pulmonary infection. Therefore, antimicrobial treatment with intravenous cephaloridine (2.0 g given every 8 hours) was administered. After 12 days, a review of chest CT showed that the pulmonary infection had not responded to the antibiotic therapy; furthermore, the patient's presenting complaints had worsened, and her inflammatory markers were rising.

At this stage, MRI suggested deleterious progression of the spondylitis involving the L2–L3 level (Fig. 1F and G). The antibiotic treatment was discontinued. Although subsequent blood culture yielded no pathogens, the MycoDot test was positive for tuberculosis. The patient was immunoglobulin G seropositive, leading to a tentative diagnosis of tuberculosis. Further investigations did not reveal any definitive localization of the tuberculosis, and the patient denied traveling to tuberculosis-endemic areas. Nevertheless, the patient was given adjuvant chemotherapy comprising isoniazid (300 mg/d), rifampicin (450 mg/d), pyrazinamide (1,500 mg/d), and ethambutol (750 mg/d) as treatment consistent with a diagnosis of tuberculosis. Concurrently, CT-guided biopsy of intervertebral disc L1–L2 was undertaken for culture and histopathology, with the aim of establishing an accurate diagnosis.

During the course of the treatment, the patient's clinical symptoms were alleviated unexpectedly. Histology of the

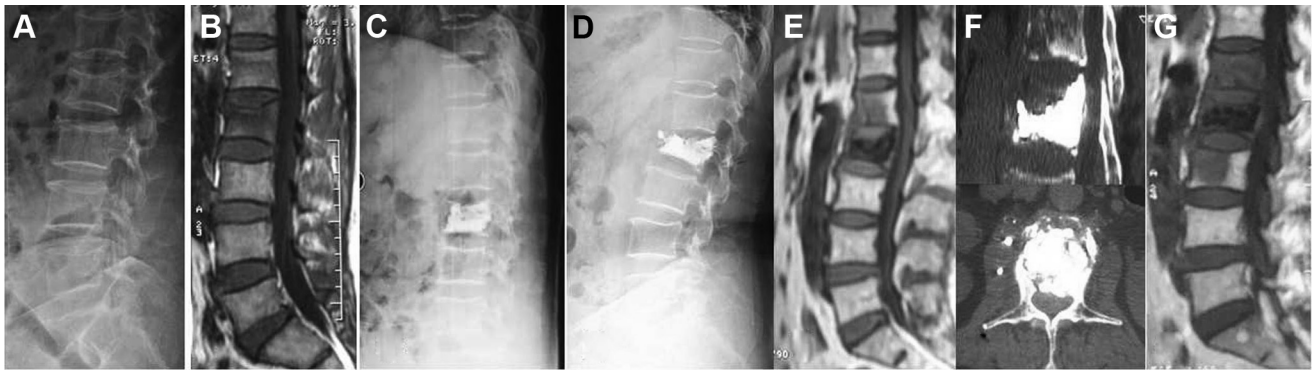

Fig. 1. (A and B) Sagittal magnetic resonance imaging (MRI) and plain radiographs of a 68-year-old woman indicating vertebral compression fracture at the L2 level. (C) Surgical vertebral augmentation was performed. (D and E) About 3 months later, plain radiography and MRI showed severe spondylitis at the L1–L2 level, with bony destruction of L2. (F and G) After 12 days, computed tomography and MRI of the same patient suggested rapid progression of infective spondylitis involving the L2–L3 level, with more severe bony destruction of L2.