Case report

Spontaneous *corynebacterium* spondylodiskitis in an immunocompetent patient: A case report and literature review

Guive Sharifi, Mehrdad Hosseinzadeh Bakhtevvari, Naveed Nabizadeh, Reza Jabbari, Mohammad Samadian, Omidvar Rezaei

Department of Neurosurgery, Loghman e Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Spontaneous *Corynebacterium* spondylodiskitis is an unusual diagnosis of spondylodiskitis, especially in healthy patients without any significant past medical history.

Materials and methods: We describe the case of a 78-year-old man with progressive low back pain for 3 months, irradiating down the lower limbs through L5 and S1 root pathways, associated with distal muscle weakness in both lower limbs. He had no history of trauma or medical problems. Laboratory investigation revealed elevated serum C-reactive protein (CRP) and erythrocyte sedimentation rate, without leukocytosis. The magnetic resonance findings demonstrated an extensive L5-S1 spondylodiskitis and L4-L5 anterolisthesis. Prior to spinopelvic fixation and posterolateral fusion, a substantial debridement was performed. The obtained tissue samples were submitted to pathological and microbiological studies, which identified *Corynebacterium* infection.

Results: One month after surgery, the pain diminished dramatically and the CRP titer diminished significantly.

Conclusion: Although cases are very rare, spontaneous *Corynebacterium* spondylodiskitis, with substantial invasion of the spine, may develop in patients lacking any history of medical or surgical problems.

Keywords: *Corynebacterium*, Low back pain, Spondylodiskitis, Spontaneous

Introduction

Infectious spondylodiskitis describes a concurrent infection of the intervertebral disc and adjacent vertebral osteomyelitis, observed spontaneously or after invasive spinal procedures or surgery.¹⁻⁴ Magnetic resonance imaging (MRI) is the diagnostic technique of choice because radiographic abnormalities only appear several weeks or months after clinical symptoms.^{5,6} A wide spectrum of microorganisms, such as *Staphylococcus aureus* (*S. aureus*), coagulase-negative staphylococci (CoNS), streptococci, gram-negative bacilli, *Mycobacterium* species, and fungi are responsible for spondylodiskitis.^{7,8} *Corynebacterium* subspecies cause these infections very rarely, and up to now, only three cases of patients who had positive medical or surgical history have previously been reported.⁷⁻⁹ According to our knowledge we describe the first case

of spontaneous *Corynebacterium* spondylodiskitis without any history of medical problem, immunodeficiency or drug use/abuse.

Materials and methods

Case report

A 78-year-old man, with a history of progressive low back pain from 3 months earlier, which radiated to the lower limbs through L5 and S1 root pathways, presented to our department. He had no history of trauma, fever, weight loss, surgical intervention or malignancy. Numbness of the feet and distal muscle weakness of both lower limbs, including decreased dorsiflexion forces (3/5 in left foot and 4/5 in right foot) and plantar flexion forces (4/5 in both feet), were the only positive findings in physical examination. There was no sphincter dysfunction. Deep tendon reflexes and upper extremities, as well as the proximal of lower limbs examinations, were normal. Laboratory investigations revealed a serum C-reactive protein (CRP)

Correspondence to: Mehrdad Hosseinzadeh Bakhtevvari, Department of Neurosurgery, Loghman Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Email: mhbakhtevvari@yahoo.com

Figure 1 Sagittal T1 (A, B) and T2 (C, D) MRI shown destructive lesion in L5–S1 vertebral bodies.

level of 58 mg/L, and erythrocyte sedimentation rate (ESR) 85 mm/h, and white blood cell count (WBC) 10 500/mm³. Blood cultures were negative. Radiographic and magnetic resonance imaging (MRI) demonstrated destructive L5–S1 space lesion end plate erosions, L4–L5 anterolisthesis and bone marrow signal changes in L5 and S1 vertebral bodies, with extensive involvement of the posterior elements of the lumbosacral spine (Figure 1).

Results

The presentation of the neurological deficit associated with radiographic instability of the L4–L5–S1 segments was a definite indication for surgical intervention. The proposed goals consisted of decompression accompanied by fusion. The patient underwent spinal surgery with midline posterior approach. The posterior ligamentous complex was affected by infection. After L5 laminectomy, the nerve roots were found to be compressed by the protruded disc. The L5–S1 disc space and irrelevant endplates appeared like necrotic tissues, lacking appropriate consistency. Therefore, partial corpectomy of L5–S1, associated with discectomy, became mandatory. The debrided tissue was sent for pathological and microbiological studies. The extensive destructive involvement of L5 and S1 vertebral bodies, highly raised the concern of corresponding vertebral

instrumentation. Therefore, pedicular screw placement in the L5 and S1 were neglected skillfully. Consequently, four alternative iliac screws were applied, while extending the fusion to the L3 and L4 segments. Following to debridement and spinopelvic fixation, a substantial amount of autogenous cancellous bone graft was introduced on the decorticated posterolateral area (Figure 2). Immediate postoperative antibiotic therapy was compatible with *Staphylococcus*, as the most commonly contributing bacteria in usual spondylodiskitis. The surprising microbiological culture results came up within one week, and demonstrated *Corynebacterium* as the main pathogenic infection. Based on the advices of the infectious disease department staff, combined antibiotic therapy, including intravenous ciprofloxacin and clindamycin, were administered for 4 weeks. During this time interval, the clinical presentation and weekly titers of ESR and CRP were monitored closely. After clinical recovery and laboratory tests improvement, the patient was discharged on prescription of oral ciprofloxacin and clindamycin for 4 weeks. Pain relief was obtained during the first postoperative month, while ESR did not reveal any considerable change, contrary to the CRP titer, which dropped remarkably. Postoperatively, the patient did not suffer any unexpected complications or aggravation of the neurological deficits. He was able to walk

Figure 2 Sagittal T1 MRI after gadolinium injection demonstrated enhancement of vertebral endplate in L5–S1.

Figure 3 Lateral X-ray shown instability in L4–L5 and L5–S1 (A). B: is lateral Lumbosacral X-ray one day after operation with pedicle screws in L3–L4 and iliac screw in iliac bone. C–D: are lumbosacral radiographs one year after surgery.

individually and without any support. At 6, 12 and 18 months postoperative follow up visits, his leg and back pain have improved, and the patient did not require any more analgesia for pain relief. After 1 year, he was pain free, with complete recovery of muscle forces and mild residual numbness of the feet. The titers of ESR and CRP reached normal range, simultaneously. He was capable to perform ordinary activities with comfort. Lumbosacral imagery revealed desirable posterior and posterolateral fusion (Figure 3).

Discussion

Low back pain is a problem that constantly confronts the spine surgeons with diagnostic and therapeutic challenges. A refined and logical approach is essential for the appropriate management of patients with suspected spine pathology.

Most back pain results from musculoskeletal strain, which resolves with conservative management. Progressive or persistent axial pain or radicular pain is more likely to result from a pathologic condition and requires a precise diagnostic assessment, include clinical findings, laboratory and radiologic investigations.

Low back pain or radicular pain associated with fever is more likely to be a result of infectious causes such as vertebral osteomyelitis and diskitis. The presence of fever is not mandatory for diagnosis, especially in elderly population. Neurological deficits in the setting of infectious process usually occur several weeks after the onset of pain and systemic symptoms, which develop as a result of compression or cord ischemia. In addition neurological deficits are more likely to develop in immunocompromised patients.

Spontaneous bacteremia with the potential to inoculate the spine is more common in immunocompromised patients such as intravenous drug abuser and patients with acquired immunodeficiency syndrome (AIDS),

although it can be occur in patients with competent immune system and in the absence of any particular risk factors.

Patients with spine infection are at risk for concomitant infections elsewhere in the body. Because of the high risk for bacterial endocarditis patient should be examined precisely. It should be considered that evaluation of a spine infection is incomplete unless the patient assessed for extra spinal manifestations.

Conditions that should be considered as the differential diagnosis include hip arthritis, sacroiliitis, pyelonephritis, degenerative disk disease, spinal trauma, osteoporotic fractures and tumors and metastatic diseases.

Evidence has shown that spontaneous spondylodiskitis is not as common as postoperative spondylodiskitis. Usually, the diagnosis and management of spondylodiskitis brings up several challenging controversies, especially when the patient has comorbidities. The incidence of spontaneous discitis has risen over the past several years due to an increase in the overall frequency of pyogenic infections.^{7–9}

Hematogenous spread is the most involved mechanism for spontaneous spondylodiskitis. Underlying diseases like prolonged neutropenia, hematologic malignancy, chronic renal failure, chemotherapy, history of prior spinal trauma or surgery, solid-organ transplantation, and conditions that require long-term use of immunosuppressive agents are the most predisposing factors.^{7,10–13} In another study, Cebrián *et al.* identified diabetes mellitus as the most common comorbidity in infectious discitis.^{14,15}

The literature review we performed discovered that only three cases of *Corynebacterium* spondylodiskitis had been reported, including two postoperative spondylodiskitis (following discectomy) and one spontaneous spondylodiskitis.^{8,9} The third case was reported by

Atalay *et al.* in 2004. The case was a 55-year-old man with chronic renal failure who presented with acute low back pain and L5–S1 spondylodiskitis, and who was treated by surgical debridement and combined antibiotic therapy consisting of vancomycin and a third-generation cephalosporin (ceftriaxone).⁷

Our report is the first case of spontaneous *Corynebacterium* spondylodiskitis in an immunocompetent patient without any underlying disease or precipitating factors. In fact, *Corynebacterium* subtypes compose the normal flora of skin and nasopharyngeal region in humans, and might spread hematogeneously to the vertebrae. However, we did not discover any skin lesions or pharyngeal infections histories in our case. Furthermore, investigation of pharyngeal swab cultures to identify *Corynebacterium* source was inconclusive.

The presence of the neurological deficit associated with radiologic instability was a definite indication for surgical intervention, and because of destructive lesion of L5 and S1 vertebral bodies, we considered vertebral instrumentation after complete debridement and irrigation.

This case is interesting because of the vigorous presentation of spondylodiskitis by an unusual causal organism in an immunocompetent patient. Although there are several reports of occult infections caused by indolent organisms that may produce persistent back pain, however, a serious invasion of the spine by a nonstaphylococcal organism in a healthy person is extremely rare.

Conclusion

Acute or subacute low back pain in an immunocompetent or immunocompromised patient might be a manifestation of spondylodiskitis. The most common pathogens are Staphylococcal pathogens. Rarely, unusual organisms, such as *Corynebacterium* could produce a serious invasion of spine, similarly to a vigorous Staphylococcal infection. Consequently, individuals with extensive involvement of vertebrae by infectious pathogens, especially antibiotic resistant cases, should raise our concern of the unusual organisms. These organisms must be addressed during laboratory investigations and antibiotic therapy of spondylodiskitis should ensue.

Disclaimer statements

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Conflicts of interest The authors declare that they do not have any conflict of interest.

Ethics approval All experiments were done in accordance with the National Institutes of Health Guide for the Care and Use of Laboratory Animals (NIH Publication No. 80–23, revised 1996) and were approved by the Research and Ethics Committee of Shahid Beheshti Universities of Medical Sciences, Tehtan, Iran.

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