Original Article

Spondylodiscitis: evaluation of patients in a tertiary hospital

Safak Kaya[1], Serdar Ercan[2], Sehmuz Kaya[3], Ulas Aktas[2], Kagan Kamasak[2], Hakan Ozalp[4], Kadir Cinar[5], Recai Duymus[6], Mehmet Gazi Boyaci[7], Nesrin Akkoyun[8], Ahmet Emre Eskazan[9], Hakan Temiz[10]

[1] *Department of Infectious Diseases, Diyarbakir Training and Research Hospital, Diyarbakir, Turkey*
[2] *Department of Neurosurgery, Diyarbakir Training and Research Hospital, Diyarbakir, Turkey*
[3] *Department of Orthopaedic Surgery, Van Training and Research Hospital, Van, Turkey*
[4] *Department of Neurosurgery, Acibadem Hospital, Ankara, Turkey*
[5] *Department of Neurosurgery, Sehitkamil State Hospital, Gaziantep, Turkey*
[6] *Department of Radiology, Diyarbakir Training and Research Hospital, Diyarbakir, Turkey*
[7] *Department of Neurosurgery, Afyon Kocatepe University Faculty of Medicine, Afyon, Turkey*
[8] *Department of Neurosurgery, Kanuni Sultan Süleyman Training and Research Hospital, Istanbul, Turkey*
[9] *Department of Internal Medicine, Division of Hematology, Istanbul University Cerrahpasa Faculty of Medicine, Turkey*
[10] *Department of Microbiology, Diyarbakir Training and Research Hospital, Diyarbakir, Turkey*

Abstract

Introduction: Spondylodiscitis (SD) is an uncommon but important infection. The aim of this work was to study the risk factors, bacteriological features, clinical, laboratory and radiological findings of SD, and to shed light on the initial treatment.

Methodology: A total of 107 patients who underwent treatment for SD were evaluated. The diagnosis of SD was defined by clinical findings, complete blood count, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), serum tube agglutination (STA) test, Ziehl-Neelsen staining, culture, histopathology, and radiological methods such as magnetic resonance imaging (MRI) and computed tomography (CT) scans.

Results: Of the 107 cases, ranging between 17 to 83 years of age, 64 (59.8%) were male. Twenty-seven (25.2%) patients had diabetes mellitus. Laboratory investigations revealed elevated CRP in 70 (65%) patients, elevated ESR in 65 (61%) patients, and elevated white blood cell (WBC) counts in 41 (38.3%) patients. Thirty-six (33.6%) patients were identified as having brucellar SD, and 5 (4.7%) patients were identified as having tuberculous SD. A total of 66 (61.6%) patients were determined to have pyogenic SD. The most frequently isolated microorganism was *Staphylococcus aureus*. Antibiotic therapy was given intravenously to all pyogenic SD patients.

Conclusions: The incidence of SD has increased as a result of the higher life expectancy of older patients with chronic debilitating diseases and the increase of spinal surgical procedures. In patients with low back pain, SD should be considered as a diagnosis. For effective treatment, it is important to determine the etiology of the disease.

Key words: spondylodiscitis; brucellosis; tuberculous; pyogenic; postoperative.

J Infect Dev Ctries 2014; 8(10):1272-1276. doi:10.3855/jidc.4522

(Received 13 December 2013 – Accepted 03 August 2014)

Introduction

Infection of the intervertebral disc and the adjacent vertebrae, variably referred to as spondylodiscitis (SD), disc space infection, and vertebral osteomyelitis, all with or without associated epidural or psoas abscesses, is hematogenous in origin in most cases [1]. SD is an infection that involves one or more of the extradural components of the spine. Its complications include epidural, paravertebral, and psoas abscess formation [2]. Etiologically, SD can be pyogenic, granulomatous (tuberculous, brucellosis, fungal), or parasitic. Its incidence has increased recently as a result of the higher life expectancy of older patients with chronic diseases, the rise in the prevalence of immunosuppressed patients and intravenous drug abusers, and the increase in spinal surgeries [3]. Diagnosis, which can be difficult, is based on clinical, laboratory, and radiological features. It is often delayed or missed due to the rarity of the disease, the insidious onset of symptoms, and the high frequency of low back pain in the general population [4]. It is important because of its potential morbidity and mortality; therefore, early diagnosis and effective antibiotherapy are required [5]. The aim of this study

was to evaluate the risk factors, bacteriological features, clinical, laboratory and radiological findings of SD, and to shed light on the initial treatment.

Methodology

This study was performed in the Departments of Infectious Diseases and Neurosurgery at Diyarbakir Training and Research Hospital, Turkey, which is a tertiary, regional referral hospital. Patients who underwent treatment for SD between 2010 and 2013 were retrospectively evaluated. Medical records, radiological imaging, bacteriologic results, and antimicrobial therapies were reviewed. The diagnosis of SD was defined by clinical findings, blood count, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), serum tube agglutination (STA) test, Ziehl-Neelsen staining, culture, histopathology, and radiological methods such as magnetic resonance imaging (MRI) and computed tomography (CT) scans.

Results

One hundred and seven patients diagnosed with spondylodiscitis were evaluated. There were 64 (59.8%) males and 43 (40.2%) females. The mean age was 52.9 (range, 17–83 years). Of the 107 patients, 27 (25.2%) had diabetes mellitus, 13 (12.1%) had cardiovascular disease, 11 (10.2%) had urinary tract infections, 3 (2.8%) had end-stage renal disease, 2 (2.2%) had malignancies, and 1 (1.9%) had rheumatoid arthritis. Fifty patients had no comorbidities or risk factors. Back pain was present in 97 (90.7%) patients, whereas neck pain was present in only 7 (6.5%) patients. Thirty-one (28.9%) patients had fever higher than 38°C, and 18 (16.8%) had a nerve root compression. Laboratory investigations revealed elevated CRP in 70 (65%) patients, elevated ESR in 65 (61%) patients, and elevated white blood cell (WBC) counts in 41 (38.3%) patients. A total of 66 (61.6%) patients were diagnosed as having pyogenic SD. Thirty-four of these 66 patients were identified as having developed the infection after spinal surgery (postoperative). Blood cultures were taken from 60/66 (90.9%) pyogenic SD cases; 22/60 (36.6%) of the blood cultures were positive. Tissue samples were obtained from 44 (66.7%) surgeries, and in 32 of the 44 (72.7%) samples, the cultures were positive (Table 1). The most frequently isolated microorganism was *Staphylococcus aureus*. Thirty-six (33.6%) patients were diagnosed as having brucellar SD. While diagnosis of brucellar SD was established by an STA test, blood cultures were positive for brucella melitensis in 9 (25%) patients. Five (4.7%) patients were diagnosed as having tuberculous SD. All 5 patients with tuberculous SD were diagnosed by histopathology; additionally, *Mycobacterium tuberculosis* was isolated from the culture of the operation material in 2 (40%) patients.

Ninety-six (89.7%) patients were investigated with MRI, and 11 (10.3%) were investigated with CT scans. Foci in the vertebral column were cervical in 6.5%, thoracic in 13.1%, lumbar in 58.2%, and lumbosacral in 26.2%. Twenty-six patients had paravertebral abscesses, 34 (31.7%) patients had epidural abscesses, and 12 (11.2%) had psoas abscesses.

Antibiotic therapy was given intravenously to all pyogenic SD patients. The duration of intravenous therapy was 4.7 weeks (range, 2–7 weeks). While anti-tuberculosis treatment was given in all tuberculous SD patients for 12 months, anti-brucellosis treatment was given for 12.2 weeks (range, 8–24 weeks). Surgical treatment was performed in 44 (41.1%) patients. Ninety-four (87.8%) patients had full recoveries, and 13 (12.1%) recovered with minimal neurologic abnormalities. No patients died due to the complications of SD and/or the treatment modalities.

Table 1. Distribution of the microbiological findings isolated from blood cultures and operation samples

Microorganism	n (%)
Staphylococcus aureus	13 (39.3)
Staphylococcus epidermidis	7 (21.2)
Escherichia coli	5 (15.2)
Klebsiella spp.	3 (9.1)
Pseudomonas aeruginosa	2 (6.1)
Enterococcus faecalis	2 (6.1)
Acinetobacter baumanii	1 (3)

Discussion

SD is a rare but serious clinical condition that may lead to severe deformity and early or late neurological complications. A number of studies have reported a bimodal age distribution with peaks at age < 20 years and 50–70-years, though all ages can be affected [6-8]. SD has a male preponderance, with a male-to-female ratio of 1.5–2:1 [8-10]. In our study, 62.6% of our patients were older than 50 years, with a mean age of nearly 52.9 years; the male-to-female ratio was 1.5:1.

The symptoms of SD are non-specific. Back or neck pain is very common, but up to 15% of patients may be pain-free. Fever is less commonly experienced and occurs in only about half of patients [8,11,12]. In Valancius *et al.*'s study [13], back pain was the most common symptom, with 72.4% of patients reporting back pain. In the same study, fever was present in 19.8% of patients, and in 4.1% of patients, varying degrees of neurological deficits (weakness or mild dysesthesia) were seen. In our study, back pain, neck pain, fever, and neurologic abnormalities were found in 97 (90.7%), 7 (6.5%), 31 (28.9%), and 13 (12.1%) patients, respectively.

Pathogens can infect the spine via three routes: by hematogenous spread, by direct external inoculation, or by spread from contiguous tissues [4]. Blood culture is a simple and cost-effective method for identifying bacterial agents of SD, as the infection is mostly monomicrobial and often has a hematogenous source [14]. In the present study, blood culture positivity was 36.6%. In another study, blood culture was positive in 6 (54.5%) of 11 patients. [15]. Direct inoculation is most commonly iatrogenic following spinal surgery, lumbar puncture, or epidural procedures and accounts for up to 25%–30% of cases in some SD series [4,16]. Thirty-four (31.7%) of our patients were identified as having developed the infection after spinal surgery.

Brucellosis, the commonest zoonosis in endemic areas, can account for 21%–48% of spinal infections, representing the predominant cause in some series from the Mediterranean Basin and the Middle East [4,17-19]. Our region is an endemic region for brucellosis. In our study, 36 (33.6%) patients were diagnosed as having brucellar SD. Brucella melitensis was isolated in the blood culture of 9 (25%) of these patients. Tuberculosis is the commonest cause of spinal infection worldwide, and accounts for 9%–46% of cases in developed countries [4,17-19]. In this study, 5 (4.7%) patients were diagnosed as having tuberculous SD. Diagnosis was confirmed by histopathology; additionally, *Mycobacterium tuberculosis* was isolated from the culture of the operation material of 2 (40%) patients.

The most common organism causing a pyogenic SD is *Staphylococcus aureus*. The range described in different studies varies from 20% to 84%. Gram-negative bacteria are causative agents in 7%–33% of pyogenic SD cases. The most frequent species are Enterobacteriaceae – *Escherichia coli*, *Proteus* spp., *Klebsiella* spp., *Enterobacter* spp., and *Pseudomonas aeruginosa*. These microorganisms are often associated with urinary or gastrointestinal tract infections, older age, immune suppression, and diabetes [3,4,20,21]. In our study, tissue samples were obtained from 44 (66.7%) surgeries; in 33/44 (75%) patients, there was a culture positivity. The most frequently isolated microorganisms were *Staphylococcus aureus* in 13 (39.3%) patients, *Staphylococcus epidermidis* in 7 (21.2%) patients, and *Escherichia coli* in 5 (15.2%) patients (Table 1). In this study, diabetes mellitus (25.2%) was the most significant risk factor for the development of SD. The second most common risk factor was urinary tract infection (10.2%).

ESR is a sensitive marker for infection but lacks specificity. Many studies have shown that an elevated ESR is present in 90% of patients with SD. CRP is similarly elevated in the majority of SD cases [22-27]. In this study, 61% of patients had elevated ESR, and CRP was elevated in 65% of patients.

SD was more evenly distributed among lumbar, thoracic, and cervical disc spaces, although the lumbar disc spaces were still the most frequently involved [28]. In our review, 62 (58.2%) patients had SD in the lumbar region. In another study, the foci in the vertebral column were located in the cervical area in 22% of the patients, the thoracic area in 23%, and the lumbosacral area in 55% [29]. SD is often found as a complication of psoas abscess and epidural abscess [30]. Of all SD cases, 25% are associated with epidural abscesses [31]. In this review, 26 patients had paravertebral abscesses, 34 (31.7%) had epidural abscesses, and 12 (11.2%) had psoas abscesses. In Aagaard *et al.*'s study [29], 36 patients had pre- or paravertebral abscesses, 60% had epidural abscesses, and 68% had either or both.

The aim of treatment is to eradicate the infection, to restore and preserve the structure and function of the spine, and to alleviate pain [4]. The prognosis is generally good in SD [31]. Ninety-four (87.8%) patients had recovered fully, thirteen (12.1%) had recovered with neurologic abnormalities, and none of the patients died.

Conclusions

Although rare, the frequency of SD is expected to rise due to the increasing numbers of elderly and immunocompromised patients and the increase of spinal surgical procedures. Management of the disease must be a multidisciplinary matter. In patients with low back pain, SD should be considered as a diagnosis. For effective treatment, it is important to determine the etiology of the disease.

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Corresponding author
Dr. Safak Kaya
Diyarbakir Training and Research Hospital
Department of Infectious Diseases
Diyarbakir, Turkey
Phone:+90 412 2580060
Fax: +90 412 2580050
Gsm: 05055395380
Email: ksafak76@gmail.com

Conflict of interests: No conflict of interests is declared.