BRIEF OBSERVATION

THE AMERICAN JOURNAL of MEDICINE®

The Unique Clinical Features and Outcome of Infectious Endocarditis and Vertebral Osteomyelitis Co-infection

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ABSTRACT

OBJECTIVE: The clinical significance of vertebral osteomyelitis and infectious endocarditis co-infection is unclear. This study investigates the rate, clinical features, and outcome of vertebral osteomyelitis with and without concomitant infectious endocarditis.

METHODS: A retrospective study of all cases of osteomyelitis with spinal imaging (n = 176), from January 2007 to April 2013, that were diagnosed as vertebral osteomyelitis. Sixty-two patients with spontaneous vertebral osteomyelitis were identified after excluding postsurgical, decubitus ulcers and spinal metastases. Seventeen (27%) were identified with concomitant infectious endocarditis.

RESULTS: All patients presented with back pain and 59% were diagnosed with infectious endocarditis subsequent to vertebral osteomyelitis. Distinguishing features among the co-infection group include the increased use of transesophageal echocardiography (94% vs 58%, $P = .004$), predisposing cardiac conditions (59% vs 16%, $P = .001$), and Gram-positive bacteremia, of which *Streptococcus* sp. and *Enterococcus* sp. were more common (35% vs 11%, $P = .026$). Adverse neurologic events were increased significantly in the co-infection group (59% vs 22%, $P = .006$). On transesophageal echocardiography, 88% of co-infection patients had highly mobile vegetations, 9 of which measured 10 mm or more. The overall mortality was 41% and 29% in the co-infection and lone vertebral osteomyelitis groups, respectively ($P = .356$). One-year mortality was identical for both groups at 24% ($P = .999$), and higher than previously reported (11.3% for lone vertebral osteomyelitis).

CONCLUSIONS: Patients with vertebral osteomyelitis, in whom infectious endocarditis is not excluded, are at increased risk for adverse neurologic events and mortality. The prompt diagnosis of infectious endocarditis, and associated high-risk features that may benefit from surgical intervention, require early evaluation by transesophageal echocardiography.

 • *The American Journal of Medicine (2014) 127, 669.e9-669.e15*

KEYWORDS: Endocarditis; Infective endocarditis; Spine infections; Spondylitis; Spondylodiscitis; Vertebral osteomyelitis

The early diagnosis of infectious endocarditis is essential for the initiation of appropriate antibiotic therapy and for the identification of patients who may benefit by early surgical intervention.[1,2] The diagnosis is straightforward in the presence of fever, cardiac murmur, and embolic phenomenon, but these classic symptoms are infrequent.[3] Furthermore, rheumatic manifestations of endocarditis or complications such as vertebral osteomyelitis may distract attention from their underlying cause.

Funding: Department of Medicine C, Chaim Sheba Medical Center.

Conflict of Interest: None.

Authorship: All authors listed had access to the data and a role in writing the manuscript. MK and RK contributed equally to the writing of this manuscript.

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0002-9343/$ -see front matter
http://dx.doi.org/10.1016/j.amjmed.2014.02.023

In our clinical experience, these patients presenting with back pain are at risk for a delayed diagnosis and worse outcomes. Reported rates and the clinical characteristics described in previous studies vary according to the intensity of use and the method of echocardiography. Pigrau et al[4] report an increased incidence of infectious endocarditis among patients with pyogenic vertebral osteomyelitis yet comparable in-hospital mortality between the 2 groups. The long-term outcome has previously been reported for lone vertebral osteomyelitis (11.3%).[5]

The purpose of our study is to characterize the rate, clinical features, and long-term outcome of infectious endocarditis among a cohort of patients with vertebral osteomyelitis. The study attempts to characterize the special features of this combination as compared with lone vertebral osteomyelitis, and thus establish it as a special clinical entity.

CLINICAL SIGNIFICANCE

- A high rate of infectious endocarditis (IE) co-infection (27%-31%) is found among patients with spontaneous vertebral osteomyelitis (VO).
- Several clinical and laboratory features are distinct among IE-VO co-infection, as compared with lone VO.
- Patients with VO, in whom IE is not excluded, are at increased risk for neurologic events and mortality.
- Early evaluation with transesophageal echocardiography is critical for the prompt diagnosis of IE and recognition of high-risk features that may benefit from early surgical intervention.

METHODS

Tel Hashomer Medical Center is a 1700-bed tertiary care center. Since 2007, all medical records have been systematically integrated into a single computer database. We reviewed all the patients with a clinical diagnosis of osteomyelitis identified from the computer database, a total of 690 patients (**Figure 1**). Among those patients, 176 had available spinal imaging (computed tomography [CT] or magnetic resonance imaging [MRI]). One hundred fourteen patients with postsurgical, decubitus ulcers and spinal metastases were excluded. All patients with a clinical diagnosis of vertebral osteomyelitis proved by spinal imaging were selected for review, a total of 62 patients (**Figure 1**). All spinal imaging studies were reviewed by a dedicated bone radiologist, blinded to the presence of infectious endocarditis, to confirm the radiologic presence of vertebral osteomyelitis. The diagnosis of vertebral osteomyelitis was established by the presence of 3 criteria[1,4]: compatible clinical picture (back pain and signs of systemic inflammation), confirmation by radiologic studies (CT, MRI, or the increased uptake on compatible combined technetium and gallium bone scans), and the isolation of the microbiologic specimen in blood specimens or percutaneous bone biopsy. **Figure 2** depicts the findings in the index case.

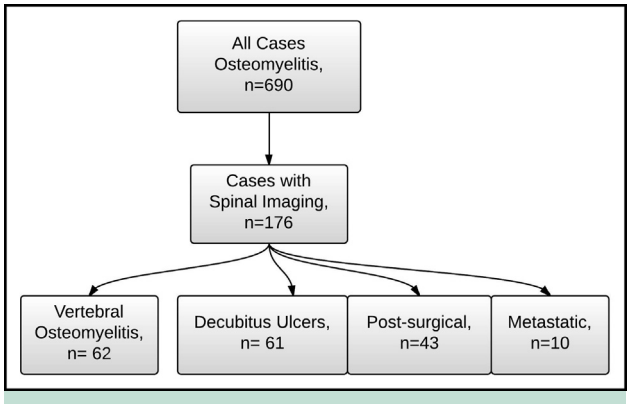

Figure 1 Process of case selection for spontaneous vertebral osteomyelitis.

Patients with confirmed vertebral osteomyelitis were systemically reviewed for their underlying medical illnesses, presenting clinical features, investigative studies, and clinical outcome. The diagnosis of infectious endocarditis was established in 17 patients according to the modified Duke criteria for "definite" endocarditis.[1,6]

Statistical Analysis

Data were analyzed with SPSS software version 21.0 (SPSS Inc., Chicago, Ill) and were presented as mean and SD for continuous variables and as frequency and percentage for categorical variables. The significance levels were set at .05.

Chi-squared tests and *t*-tests were performed to compare the 2 groups (vertebral osteomyelitis [VO] and infectious endocarditis-vertebral osteomyelitis co-infection [IE-VO]) for categorical and continuous variables, respectively.

The Kaplan-Meier survival curves were presented to compare the cumulative survival curves between VO and co-infection groups by using the Log-Rank test. Length of follow-up was calculated as time from screening to death from all causes or time of screening to the end of follow-up (April 2013).

RESULTS

During the period of January 2007-April 2013, 62 patients were identified with vertebral osteomyelitis, after the exclusion of postsurgical, decubitus ulcers and metastatic cases (**Figure 1**). Among these patients, 17 (27%) were identified with concomitant "definite" infectious endocarditis. Three patients with a clinical diagnosis of endocarditis met the modified Duke criteria for "possible" but not "rejected," and were included in the lone vertebral osteomyelitis group. Among the 17 patients with combined infection, 10 (59%) were diagnosed with infectious endocarditis subsequent to the diagnosis of vertebral osteomyelitis, with a diagnostic delay ranging between 2 and 188 days (median 7, interquartile range 17.5).