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Clinical Study

Spondylodiscitis by drug-multiresistant bacteria: a single-center experience of 25 cases

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Abstract

BACKGROUND CONTEXT: Although the incidence of pyogenic spinal infections is increasing, the ideal treatment of spondylodiscitis is still a controversially discussed issue. Furthermore, the proportion of multiresistant bacteria in spondylodiscitis is increasing, and treatment recommendations or reported results are missing for this especially difficult subset of patients.

PURPOSE: The aim of this study is to evaluate the surgical outcome and the postoperative antibacterial treatment regime.

STUDY DESIGN: Retrospective case series.

PATIENT SAMPLE: Patients treated for a spondylodiscitis from multiresistant bacteria at our department between 2006 and 2011.

METHODS: Data were gathered through review of patients' case notes, relevant imaging, and electronic records. Magnetic resonance imaging of the whole spine including gadolinium (Gd)-enhanced T1 sequences and computed tomography scans of the affected regions were obtained in all cases.

OUTCOME MEASURES: C-reactive protein (CRP) and complete blood cell count were analyzed in all cases using routine laboratory techniques. Neurologic deficits were classified according to the American Spinal Injury Association (ASIA) impairment scale.

RESULTS: Twenty-five patients were identified (15 gram-positive and 10 gram-negative drug-multiresistant bacteria). The mean age at presentation was 66 years, and 14 patients were male (56%). All patients presented with pain, and a neurologic deficit was present in 11 (44%) cases. An epidural abscess was found in 11 (44%) cases. At admission, CRP was elevated in all cases with a mean of 13±9.2 mg/dL. The main source of infection was previous spine surgery (36%). All patients in this series underwent surgical debridement of the infection and instrumentation of the spine. Postoperative intravenous antibiotics were administered for 19±8.6 days followed by 3±0.3 months of oral antibiotic therapy. Eradication of the infection was achieved ultimately in all surviving patients. Out of 11 patients with neurologic deficits, 4 had a full recovery, 4 improved incompletely, and 3 remained unchanged after surgery.

CONCLUSIONS: Staged surgical immobilization and instrumentation and optimal debridement at the interdiscal space and spinal canal is a reliable approach to achieve complete healing of spinal infection with multiresistant bacteria. A period of intravenous antibiotic therapy of 2 to 3 weeks

FDA device/drug status: Not applicable.

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followed by a 3-month oral antibiotic therapy seems appropriate for most cases.

Key words: Multiresistant bacteria; Spondylodiscitis; Discitis; Surgical management; Spinal instrumentation; Interbody fusion

Introduction

Infections by drug-multiresistant bacteria are a major public health problem, and treatment options are declining with the absence of more potent microbial agents [1,2]. Among the gram-positive organisms, methicillin-resistant *Staphylococcus aureus* (MRSA) and glycopeptide-resistant enterococci represent the largest therapeutic obstacle. After the introduction of penicillin and thereafter methicillin, *S. aureus* rapidly developed resistance to the β-lactam compounds, and by 2003, more than 50% of *S. aureus* isolates recovered in US hospitals were MRSA [3]. The emergence of gram-negative drug-multiresistant organism is even more worrisome because no new antibiotics are in advanced stages of clinical development.

Infections with these bacteria are an increasing problem that also involves the spine in the form of a spondylodiscitis. The incidence of hematogenous spondylodiscitis including non-multiresistant bugs is increasing [4]. The reason is probably multifactorial: an increasingly aging population with an increasing incidence of chronic immune-compromising diseases, more frequent operations of the spine, a greater use of invasive procedures and intravenous lines, and the evolution in diagnostics [5,6]. Moreover, the incidence of spondylodiscitis by drug-multiresistant bacteria is increasing which possesses an additional treatment challenge. The clinical management of spondylodiscitis, surgical or conservative, varies and is still a controversial issue. To date, there are no guidelines for surgical treatment or treatment strategies of pyogenic spinal infections by drug-multiresistant bacteria.

Materials and methods

We performed a retrospective review of patients who underwent surgical treatment for spondylodiscitis by multiresistant bacteria between 2006 and 2011 at our department.

Twenty-five consecutive patients were identified, and their data were retrospectively examined. Data were gathered through the review of patients' case notes, relevant imaging, and electronic records. Magnetic resonance imaging of the whole spine including gadolinium (Gd)-enhanced T1 sequences was available for all cases. Computed tomography (CT) scans of the affected regions were available and evaluated for all cases to assess the extent of bony destruction. Patients were considered to have fever if their temperature was 38.5°C or more. C-reactive protein (CRP) and complete blood cell count were analyzed in all cases using routine laboratory techniques. Neurologic deficits were classified according to the ASIA impairment scale. The classification of drug-multiresistant gram-negative bacteria was performed according to the Robert Koch Institute recommendation [7] and is summarized in Table 1.

For patients with neurologic deficits, the surgical debridement, decompression, and stabilization accompanied with antibiotic therapy was strongly recommended. All other patients were advised about treatment options as conservative treatment with bed rest and subsequent mobilization in a brace or surgical debridement and stabilization each accompanied first by intravenous and then by oral antibiotic therapy. However, surgical treatment was recommended for these cases with multiresistant bacteria because outcome was expected to be superior after surgical debridement.

The surgical approach and method of spinal instrumentation were determined for each patient individually according to present comorbidities and extent of bony destruction. Options used were anterior cervical discectomy or corpectomy and fusion with or without dorsal instrumentation or dorsal instrumentation alone for patients with cervical spondylodiscitis. For patients with infection of the thoracolumbar spine, options used were dorsal instrumentation with or without interbody fusion. If technically feasible, interbody fusion was performed using a posterior transforaminal approach, and if not feasible, an anterior or anterolateral approach was subsequently selected. Antibiotic treatment included a short period of broad-spectrum intravenous antibiotic therapy followed by oral antibiotics for a period of approximately 3 months. After approximately 3 months of antibiotic treatment and normalization of all inflammatory laboratory values, antibiotics were stopped. Thereafter, patients had a weekly control of inflammatory blood values for another 2 months. Cure of inflammation was considered to be complete if patients showed no signs or symptoms of active localized infection by clinical examination and inflammatory blood markers after discontinuation of antibiotic treatment. Neurologic outcomes mentioned are at a minimum of 3 months postoperative. Final additional follow-up at a minimum of 12 months was performed by a telephone interview; no patient was lost to follow-up.

Results

Patient characteristics

Twenty-five patients have been identified with spondylodiscitis from multiresistant bacteria, whereas 136 patients with non-multiresistant bacterial spondylodiscitis were treated during the same period. Thereby, the proportion of multiresistant bacteria in our spondylodiscitis patients is 15.5% (25/161).