



Myths and facts of spondylodiscitis : An analysis of 183 cases

Mustafa CITAK, Manuel BACKHAUS, Thomas KÄLICKE, Ziad HILAL, Gert MUHR, Thomas M. FRANGEN

From BG-University Hospital Bergmannsheil Bochum, Ruhr-University, Bochum, Germany

The authors conducted a retrospective study on 183 cases of spondylodiscitis, treated conservatively (44%) or surgically (56%) between November 1991 and June 2006. The male/female ratio was 99/84, and the mean age 62.6 years. The mean follow-up period was 12 years (range 4-19). Interesting from a clinical viewpoint : temperature, white blood cell count, and CRP were sometimes normal, while pain varied from slight to unbearable. The commonest risk factor was diabetes mellitus, and the most frequent pathogen was *Staphylococcus aureus*. Methicillin resistant *Staphylococcus aureus* (MRSA) was found in 6 patients, and 3 or 50% of these died, in sharp contrast with the overall mortality rate of 8.7%. A neurological deficit was seen in 43.7% of the patients ; complete recovery occurred in 71% of the patients with a Frankel D stage, but in only 15.4 to 22.2% of those with a stage A, B or C.

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than younger subjects (17,20,25). The following predisposing factors have been described : diabetes mellitus, malnutrition, alcohol or drug abuse, sickle cell anaemia, immunosuppressive conditions like HIV or steroid therapy, tumours and renal failure (1,4,17,19,22,24,26) (see also Table I).

The clinical diagnosis is still a challenge. The spinal pain can be unbearable, as well as vague. The temperature can vary from normal to very elevated. Confusing symptoms are sweating, malaise, loss of weight and anaemia. The sedimentation rate and the CRP can be normal. The time interval between the first symptoms and the diagnosis is often impressive, in spite of improved technical means, such as MRI : 2 to 6 months (4,9,16,18,19,22). MRI is the imaging modality of choice (5,7,23). Computed Tomography is also sensitive, but MRI is superior for the identification of spinal cord compression or

INTRODUCTION

Spondylodiscitis is a rare bacterial infection of the vertebrae and the intervertebral discs, with an incidence varying from 1 per 100.000/year to 1 per 250.000/year (1,4). However, the incidence is increasing, which is probably due to aging of the population and to an increasing number of invasive procedures (8,11,15). The most frequent pathogen is *Staphylococcus aureus* (5,6,12).

In general, men are three times more often affected than women (4,17,19,20) and elderly subjects more

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- Mustafa Citak, MD, Orthopaedic Resident.
 - Manuel Backhaus, MD, Orthopaedic Resident.
 - Thomas Kälicke, MD, Assistant Professor.
 - Ziad Hilal, MD, Orthopaedic Resident.
 - Gert Muhr, MD, Professor and Chairman.
 - Thomas M. Frangen, MD, Assistant Professor.
- Department of General and Trauma Surgery, BG-University Hospital Bergmannsheil, Bochum, Germany.
Correspondence : Mustafa Citak, MD, Bürkle-de-la-Camp-Platz 1, 44789 Bochum, Germany. E-mail : mcitak@gmx.de
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abscess formation, and for the differentiation between discitis, metastases and degenerative changes (21). Spinal biopsy is recommended by several authors, in order to identify the pathogen. It is routinely performed with the aid of an image amplifier or under CT-guidance: a peroperative open biopsy is sometimes preferred.

MATERIALS AND METHODS

The authors retrospectively traced 221 patients above age 18, treated between November 1991 and June 2006. Thirty-eight records were not available, so that a total of 183 patients were included in the study.

The neurological condition was defined according to the Frankel classification (A,B,C,D,E, where A is the worst possible condition).

RESULTS

Demographic data

There was a slight male preponderance: 99 males versus 84 females, totalizing 183 patients. The mean age was 62.6 years (range: 21-91 years). The mean follow-up period was 12 years (range: 4-19). Most patients (156 patients or 85%) were initially treated in a referring hospital. Unifocal localization was seen in 171 patients, and bifocal localization in 12 patients. The lumbar spine was affected in 84 cases, the thoracic spine in 66 cases, the cervical spine in 14 cases, the lumbosacral junction in 13 cases and the sacrum (spondylitis) in 6 cases. The cause of the spondylodiscitis was unknown in 91 cases (49.7%), while it was known in 92 cases: spinal surgery in 21 (11.5%) and extraspinal infection in 71 (39%). The spondylodiscitis led to an intraspinal abscess in 17 cases, and to an extraspinal abscess in 41 cases: the psoas major muscle and the paravertebral area were the most common abscess localisations.

Surgical treatment was performed in 102 (56%) cases, while a non-surgical procedure was chosen in 81 (44%) cases. The mean hospital stay was 57.5 days (range: 2-655 days). Overall, 16 patients (8.7%) died during their hospital stay. Six out of these 16 patients died after conservative treatment.

Risk factors

Table I shows the frequency distribution of the risk factors. Sixty-four patients had one, 48 patients had two, 25 patients had 3, 6 patients had 4, and 2 patients had 5 risk factors. In 38 patients no risk factor could be identified. The most common risk factor was diabetes mellitus (62 out of 183 cases or 33.9%), followed by immunosuppression (21.9%), sepsis (14.8%) and neoplasia (11.5%). The mean number of risk factors per patient was 1.5.

Laboratory findings

On admission 154 patients (84.2%) had increased CRP values. Interestingly, 29 patients (15.8%) had a normal CRP. The mean CRP of the group as a whole was 10 mg/dl (range 0.6-40.8 mg/dl). Leukocytosis was noted in only 48 patients, a normal WBC count in 131 patients, and leukocytopenia in 4 patients. The mean WBC count for the group as a whole was $10.2 \times 10^9/l$ (range 2.1-39.1 $\times 10^9/l$). Only 17 patients were febrile on admission, and the mean body temperature for the group as a whole was 36.9° Celsius (range 35.6-40.0°).

Table I. — Risk factors for spondylodiscitis in all 183 patients

| | Number of patients | % |
|-----------------------------|--------------------|-------|
| Diabetes mellitus | 62 | 33.9% |
| Immunosuppressive drugs | 40 | 21.9% |
| Sepsis | 27 | 14.8% |
| Neoplasia | 21 | 11.5% |
| Previous spinal surgery | 18 | 9.8% |
| Renal failure | 17 | 9.3% |
| Alcohol abuse | 13 | 7.1% |
| Nicotine abuse | 11 | 6.0% |
| Previous abdominal surgery | 10 | 5.5% |
| Drug abuse | 7 | 3.8% |
| Hepatitis B and C | 4 | 2.2% |
| Tuberculosis | 4 | 2.2% |
| Previous systemic infection | 2 | 1.1% |
| Liver cirrhosis | 1 | 0.5% |
| Sickle cell anemia | 1 | 0.5% |

Table II. — Pathogens found in 92 patients

| | Number of patients | % |
|-------------------------------------|--------------------|-------|
| Staphylococcus aureus | 60 | 65.2% |
| Staphylococcus epidermidis | 8 | 8.7% |
| Escherichia coli | 8 | 8.7% |
| Methicillin-resistant Staph. aureus | 6 | 6.5% |
| Mycobacterium tuberculosis | 5 | 5.4% |
| Pseudomonas aeruginosa | 5 | 5.4% |

Microbiological findings

One or more pathogens were found in 92 patients (50.3%) (Table II). *Staphylococcus aureus* was the most frequent offender (60 cases), as usual ; its methicillin-resistant variant was present in 6 cases. The cultures revealed a monobacterial infection in 80 patients, 2 species in 10 patients, 3 in one patient, and 5 in one patient.

Neurological deficit

A neurological deficit was noted in 80 out of 183 patients. Complete recovery to Frankel stage E was rare in stages A, B and C (range 15.4 to 22.2%) ; however, it reached 71% in patients with Frankel stage D.

DISCUSSION

Vertebral osteomyelitis or spondylodiscitis is an uncommon, mainly haematogenous condition which usually affects elderly patients (17,19,20,25). However, the incidence is increasing, which might be due to aging of the population and to an increasing number of invasive procedures (8,11,15). The current study includes only 54% males, while other studies have reported a distinct male predominance, ranging from 58% to 91% (10,13).

The clinician must realize that pain can vary from slight to unbearable, while body temperature, white blood cell count, sedimentation rate and CRP can be normal.

In the current study, diabetes mellitus was the most common predisposing factor, a finding

confirmed by Al-Nammari *et al* (2). Spinal procedures were responsible in 22.6% of the cases, which is more than in other studies (3), although Kim *et al* (14) confirmed this tendency.

Methicillin-resistant *Staphylococcus aureus* (MRSA) was seen in 6 patients. Three or 50% of these patients died, while the overall mortality rate was 8.7%. Also Al-Nammari *et al* (2) described a high mortality rate (38%) in patients with MRSA spondylodiscitis : therefore, these authors recommend a wide-spectrum antibiotic therapy, which includes the MRSA spectrum, in patients with spondylodiscitis with unclear microbiological findings. An intriguing aspect of patients with MRSA spondylodiscitis was the age distribution. They were on an average 10 years older, which might be the reason for the high mortality rate.

The incidence of neurological deficits was as high as 43.7% in the current study. Karadimas *et al* (12) reported an incidence of only 13.5% in a series of 163 patients. This high incidence is probably explainable by the fact that the Bergmannsheil hospital is a tertiary referral center for spinal cord injuries. It serves the whole state of North Rhine-Westphalia, covering a population of about 18 million people.

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