Acta Orthop. Belg., 2009, **75**, 566-570

CASE REPORT

Management of a post-operative multi-resistant infectious spondylitis associated with a kyphotic deformity

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Anterior spinal infection (prevertebral abscess and/or discitis) after posterior instrumentation for vertebral fractures is a challenging complication, since a new implant may become necessary anteriorly, in a septic environment. Generally accepted management guidelines are yet to be established. The authors present a case of posterior instrumentation for fractures of T12 and L1, complicated after 9 months with an anterior infection (prevertebral abscess and discitis) with extended-spectrum beta-lactamase (ESBL) producing *Escherichia coli* (*E.coli*). This case is unique in that the multi-resistant organism was isolated only after the second stage of infection treatment, which consisted of anterior débridement and anterior implantation of titanium cages and rods. In this particular case, infection was controlled despite implantation of multiple cages, screws and rods, and fusion was achieved, by means of intravenous antibiotic treatment for 12 months. At the latest follow-up, 24 months post surgery, there was no evidence of infection. This problem case may be helpful for surgeons confronted with spinal deformities secondary to infections with multi-resistant organisms.

Keywords : post-operative infection ; kyphosis ; instrumentation ; extended-spectrum beta-lactamase (ESBL) producing *Escherichia coli (E. coli).*

INTRODUCTION

Spinal instrumentation has become a common procedure. This has led to an increase in the absolute number of postoperative spinal infections (*1*), although preoperative antibiotic prophylaxis has reduced their relative frequency (*16*). Immuno-deficient patients and multi-resistant bacteria present new challenges in the management of spinal surgery infections (*2*).

General guidelines are still lacking. The authors found no *prospective* studies investigating strategies for the treatment of spinal infections, in particular with multi-resistant organisms. However, they identified several *retrospective* studies (*1,8-10,12,14,16*). Unfortunately, these studies described small series and heterogeneous patient groups with superficial and deep infection, primary and postoperative infection, with and without instrumentation. The authors present a challenging case of postoperative spinal infection with a multi-resistant *E. coli* treated with 12 months of intravenous carbapenem.

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The department received financial support in the form of a research grant from DePuy Spine, Inc., Raynham, Massachusetts, United States.

CASE REPORT

While on holidays abroad, a 29-year-old woman, on antiepileptic medication, fell and sustained fractures of T12 and L1. A skin laceration made immediate surgery impossible. Two weeks later a posterior T11-L2 instrumentation was performed. The postoperative period was complicated with a urinary tract infection, which was treated with antibiotics. Nine months later, the patient was seen again with pain, a discharging wound and kyphosis. Plain radiographs showed loosening of the proximal pedicle screws T11 with recurring kyphosis (fig 1a). Cultures showed *Escherichia coli*. In a first stage, posterior débridement and implant removal (fig 1b) were carried out, followed by intravenous antibiotic treatment using a third generation cephalosporin (ceftriaxone). However, a gadolinium enhanced MRI scan, performed two weeks after surgery, showed evidence of prevertebral abscess formation and two-level discitis (fig 2). Bone densitometry showed osteoporosis and the patient was thus started on a biphosphonate treatment in view of the pending stabilization procedure. In a second stage, six weeks after implant removal, anterior débridement using a left sided thoraco-abdominal approach was performed. At the same occasion reconstruction was carried out from T9 to L2, using titanium mesh cages filled with autologous iliac crest grafts, along with an anterior dual rod fixation system (DePuy Spine, Inc., Raynham, MA, USA) (fig 3a & 3b). Satisfactory sagittal alignment was achieved. Unfortunately, specimens taken from the T10-T11 and T11-T12 discs during the aforementioned reconstructive procedure tested positive for extended-spectrum beta-lactamase (ESBL) producing

Fig. 1a. — Plain radiograph, lateral view : fractures T12 and L1, nine months after posterior instrumentation Th11-L2 ; loosening of the pedicle screws Th11.

Fig. 1b. — Plain radiograph, lateral view : after implant removal and posterior débridement ; the kyphosis necessitates further surgery.

Fig. 2. — Sagittal T1-weighted enhanced MRI : discitis T10-T11-T12 and prevertebral abscess (arrows).

E. coli. Antibiotic treatment was accordingly modified to carbapenem, administered intravenously for a 12-month period. A removable brace was applied for 6 months. The patient was discharged from the hospital three months after her admission. At latest follow-up (24 months), a CT-scan showed evidence of bony union while infection markers remained normal. The patient was pain free and had returned to full activities.

DISCUSSION

The infection risk after spinal surgery increases above age 60, and also in diabetics, smokers, and overweight persons (*4*). None of these risk factors were present in our patient, but she had a skin laceration in the operative area and a postoperative urinary infection. Spinal surgery with instrumentation has been shown to have a higher infection rate when compared to non-instrumented procedures (*12,18*). The infection reported in our patient may have been caused by direct inoculation during the initial operation, or by late haematogenous spread from the postoperative urinary tract infection. These are the most common pathways in spinal infections (*2*).

***Fig. 3*a.** — Plain radiograph, A-P view : cages and anterior rod instrumentation T9-L2.

Several authors recommend débridement and closed suction-irrigation, allowing to keep the instrumentation in place (*12,17,18*). In the current

Fig. 3b. — Plain radiograph, lateral view : cages and anterior rod instrumentation T9-L2.

case however, loosening of the posterior implants, nine months after the initial surgery, dictated their removal, while the kyphosis necessitated a re-instrumentation.

The use of instrumentation for the management of spinal infection has been discussed diversely in recent years. Although the infection may be difficult to eradicate with instrumentation *in situ,* internal fixation is often mandatory to maintain the correction of a multilevel deformity. Several reports describe successful bony fusion after instrumentation in spite of pre-existing spinal infection, while later removal of the implant is not always necessary (*10-12,14,18*). Titanium may be preferred to stainless steel, while its porous surface limits the growth of a bacterial microfilm (*6*) : titanium mesh cages have been used in many infected cases and seem to be a safe option (*8-11*). Moreover, titanium facilitates imaging.

As an alternative, a free vascularised fibula graft can be used as a salvage procedure in spinal infection after failed spinal fusion (*3*).

Controversy exists in the literature as to whether infected spinal instrumentation should be treated in one or two stages (*10,13-15*). The risk of continued infection may be higher in one-stage procedures. However, a two-stage strategy may also be compromised by the patient's general condition, already weakened by the infection, the first operative trauma, and possible malnutrition and prolonged immobilization (*10*). In the reported case a two-stage procedure (1. posterior débridement and removal of posterior instrumentation ; 2. anterior débridement and anterior instrumentation) was chosen for the reasons mentioned above, but also to determine the exact nature and antibiotic sensitivity of the causative organism.

More specifically for the treatment of *anterior* spinal infections, as well a one-stage anterior-posterior approach (*8,10*) as a two stage procedure (*5*) have been advocated for the treatment of anterior spinal infections. In the first case posterior fixation and anterior débridement with grafting take place on the same day. Also the authors chose a one-stage, but only anterior approach for débridement, reduction of kyphosis, and internal fixation. In this way a radical discectomy was achieved. Moreover, such use of anterior spinal instrumentation has been reported to reduce the risk of septic complications when compared to posterior fixation (*12*). Nevertheless, a posterior approach has been described as an easier

method to restore a physiological sagittal alignment, especially in case of multiple-level spondylodiscitis (*7*).

Adding to the complexity of this case, the presence of a micro-organism resistant to the initial antibiotic treatment was only demonstrated after re-instrumentation. Ideally the anterior re-instrumentation should have been delayed while administering the appropriate antibiotic treatment, as would be commonly done in the case of an infected hip or knee arthroplasty. However, this would have implied a three-stage procedure including a repeat thoraco-abdominal approach with the likelihood of significantly increased morbidity. Such a three-stage approach has not been described in the literature to the authors' knowledge.

Finally, in order to minimize the risk of a recurring infection, it was decided to continue the intravenous carbapenem treatment until bony union, in this case during 12 months. Such a strategy has also been suggested by Abbey *et al* (*1*) for the treatment of a deep wound infection following spinal surgery, if the probability of implant infection is high after débridement.

CONCLUSION

This case is unique in that a multi-resistant organism was identified *after* a two-stage re-intervention for infected posterior spinal instrumentation. A 12 months course of intravenous carbapenem cotrolled the infection and allowed fusion. This case may be helpful for surgeons confronted with similar problems.

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