Pyogenic Infection Following Single Level Nucleotomy

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41.1 Introduction

Postprocedural infections of the spine are a dreaded complication putting great strain on both patients and surgeons alike. While the incidence of postoperative discitis in spine surgeries without instrumentation is often cited up to 4%, approx. 480.000 nucleotomies are performed yearly in the United States alone [1, 2]. These figures highlight the necessity for every spinal surgeon to be familiar with the diagnostics and management of postoperative infections. With the following case we will try to illustrate a typical case of postprocedural discitis managed with dorsal instrumentation and interbody fusion.

41.2 Case Description

A 49 year old patient, unable to stand or walk unaided, was urgently referred to the clinic by his general practitioner with fever and strong low back pain without radiculopathy following a right sided sequestrectomy at L4/5, 5 weeks ago. The patient had no prior illness or other prior surgical intervention and performed moderate physical labor. His GP prescribed oral second generation cephalosporins (cefaclor) for the last 2 weeks. Upon clinical examination the patient was pale and exsiccated with a fever of 39.3 °C. His lower back was mildly reddened with strong tenderness upon touch and percussion. Repetitive jarring of the examination gurney as well as heel-drop jarring (modified Markle's sign) elicited strong low back pain. The neurological examination showed intact sensory and motor functions. He was admitted, complete lab-workup and blood cultures were drawn and fluids administered over an iv-line. His bloodwork showed a leukocytosis with 20/nl and c reactive protein at 19 mg/dl albeit with procalcitonin within normal range. Urine analysis was performed as part of our admittance panel and was without pathological findings. Ap and lateral plain x-ray showed light degenerative changes as well as a light scoliosis (Figs. 41.1 and 41.2). MRI scans revealed hyperintensity in the dorsal disk space, both endplates as well as throughout the former approach on STIR sequences (Fig. 41.3) and high uptake on contrast enhanced T1 sequences (Figs. 41.4 and 41.5). The current antibiotic course was interrupted as his current condition indicated its futility. The patient was counselled that lacking other possible source this constellation had all but proven a postoperative infection. Surgical and conservative options (percutaneous biopsy followed by long double-course i.v. antibiotics) were presented to him. The monosegmental

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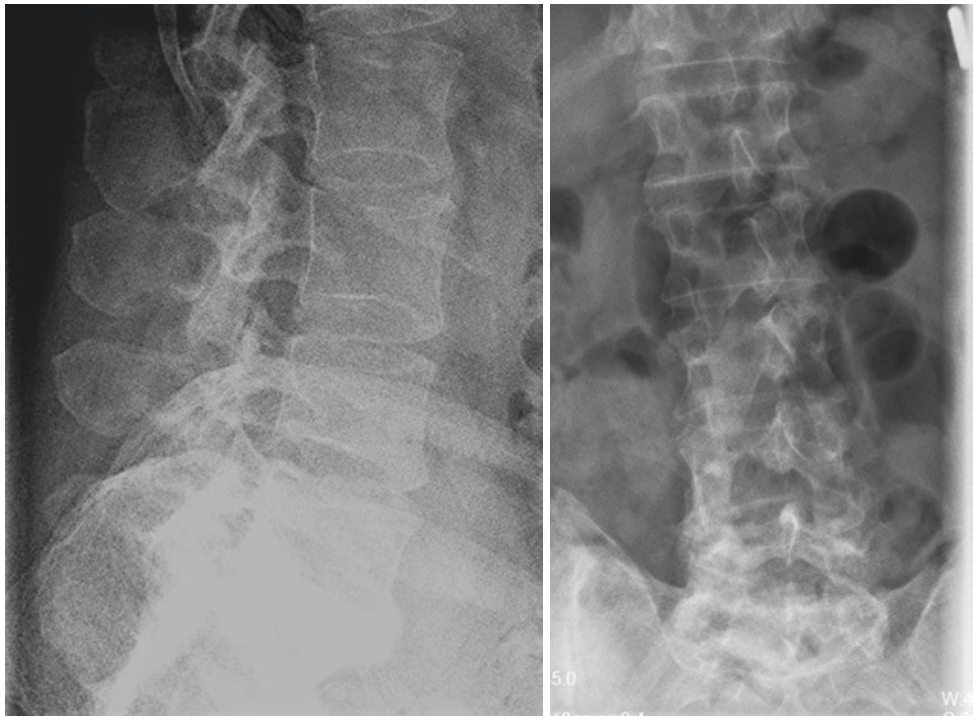


Figs. 41.1 and 41.2 Plain standing X-ray in ap (Fig. 41.1) and lateral view (Fig. 41.2) showing light degeneration of the facet joints and a light scoliosis, possibly accentuated by pain

interbody fusion, thorough debridement of the intervertebral space with dorsal instrumentation was clear recommended and accepted by the patient. A dorsal instrumentation at L4/5 in PLIF-technique with surgical titanium mesh cages loaded with bone chips and antibiotic carriers was performed (Figs. 41.6 and 41.7). On recommendation of our microbiologists he received a 14 day course of i.v. rifampicin and vancomycin followed by an oral course of rifampicin and levofloxacin for 4 weeks and levofloxacin as a mono-therapy for another 4 weeks. Pathology confirmed the diagnosis of spondylodiscitis and a cephalosporin resistant strain of *staph. epidermidis* was isolated. Ambulation was allowed directly postoperative and was aided by physiotherapists. The patient recovered well and resumed labor 5 month post-surgery. On his insistence, albeit with lacking symptoms, the patient was referred by his GP to a radiologist for a follow-up MRI without contrast. This showed no further signal hyperintensities on T2 (Fig. 41.8).

41.3 Discussion of the Case

Even with today's technological advance the start of every medical treatment remains an adequate patient history and physical examination. From the clinical presentation alone one already suspects a pyogenic infection of the spine. Following this a comprehensive bloodwork, including CBC, CRP, procalcitonin, coagulation status, liver and kidney function should be obtained. CRP naturally peaks postoperatively but normalizes quickly, making it a reliable indicator for bacterial infections with a sensitivity and specificity of 100% and 97% [3]. In clinical practice normal procalcitonin is often seen, even with microbiological findings and a small series came to the same result finding no significant differences in PCT elevation between spondylodiscitis and reoccurrence of disc herniation [4]. While often negative, it is general practice that blood cultures from all patients admitted with a suspected spinal infection, are drawn. This can facilitate the

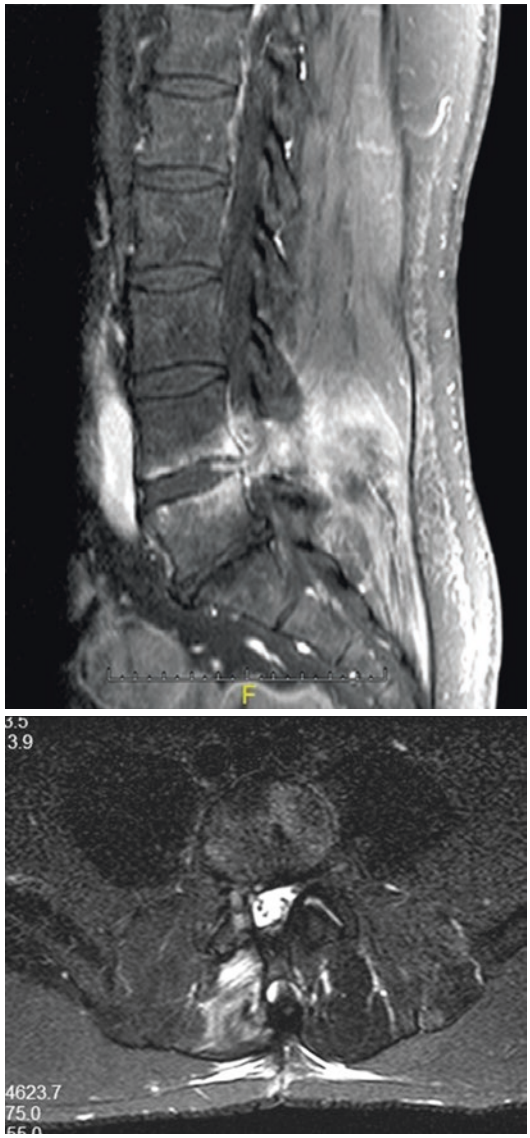
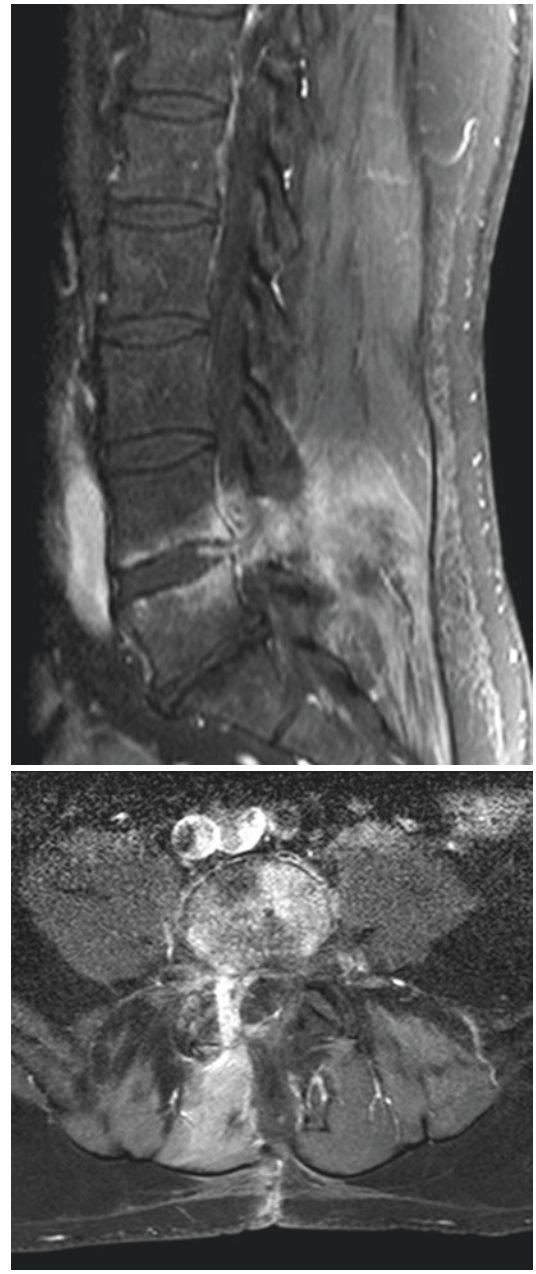


Fig. 41.3 MRI of the lumbar spine in STIR (short tau inversion recovery) sequence. Notable is the enhanced signal, indicative of edema, in the endplates as well as the paravertebral muscles along the approach in the axial view (Fig. 41.4)



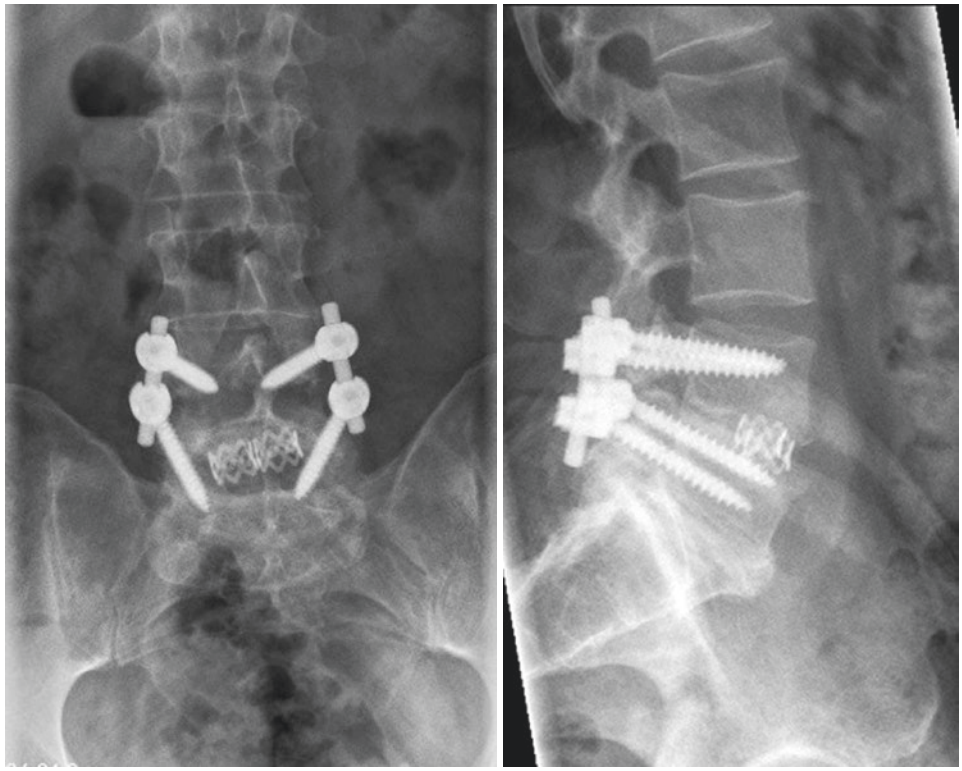
Figs. 41.4 and 41.5 MRI of the lumbar spine in contrast enhanced T1 sequence. Hypervascularization, confirming inflammation, is shown in sagittal (Fig. 41.4) and axial view (Fig. 41.5)

identification of pathogens when surgery or biopsy is delayed.

Contrast enhanced MRI should be the investigation of choice showing hyperintensity in T2/STIR, hypointensity in T1 and enhancement in the disc space and in the adjacent endplates with or without perifocal reaction. Important to mention is, to check the peridural space and the paravertebral region, concerning abscess-formations.

If the patients current condition allows antibiotics should not be started or should be paused until microbiological samples were acquired.

The segment was considered to be less then fully stabile because the patient described axial



Figs. 41.6 and 41.7 Plain standing X-ray in ap (Fig. 41.7) and lateral view (Fig. 41.8) showing the postoperative status with monosegmental dorsal instrumentation (pedicle screws and rods) and interposition of 2 STM (surgical titanium mesh) –cages in PLIF technique

loading pain, pain with torsional motion while lying and ambulation only with aid of a wheeled walker, thus a stabilizing procedure with instrumentation was chosen. Due to the infected intervertebral disc-space a thorough debridement, followed by an interbody fusion to guarantee the sagittal profile in a young patient, was done. Yet it remains a controversial topic over the best approach to the surgical management with a generally scarce data and newer studies, albeit with limitations, describing no significant difference between decompression and debridement alone versus fusion [5]. If there is minimal or no damage to the anterior column, yet the patient still presents with clinical signs of instability, a dorsal instrumentation, be it percutaneous or open, can be performed with or without decompression. Bed rest under i.v. antibiotic course until CRP reduction and mobilization in stabilizing braces is a justified option. There is little evidence for a rigid brace (e.g. TLSO) versus passive assisted or semi rigid brace.

Even if a conservative treatment is convened upon a biopsy for cultures and susceptibility testing to guide the future antibiotic course is strongly advocated. When none can be obtained or cultures are negative the empirical treatment should be based on local microbial resistances, if necessary in consultation with a microbiologist. A combination therapy helps reduce the risk of resistance occurrence and fluoroquinolone + rifampicin is often recommended for staph. infections [6]. While no significant difference was reported versus a 6 week course, longer courses of up to 12 weeks should be considered in patients with present implants [7].

A follow-up with patient history, clinical examination and plain standing X-rays is recommended at 12 weeks postoperatively CT or MRI is only recommended in symptomatic patients.

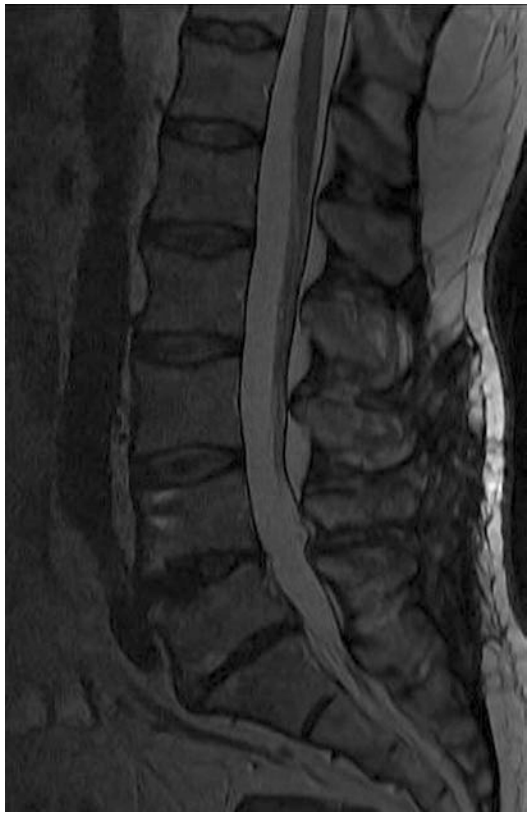


Fig. 41.8 Sagittal T2 sequence showing a free spinal canal and no edema at 5 month postoperatively

41.4 Conclusions and Take Home Message

Postprocedural spinal infections are a dreaded complication but every spinal surgeon should strive to know how to diagnose and treat, even though, unfortunately, more than just a few times the clinical presentation isn't as clear-cut as in the presented case. Whenever possible antibiotic treatment should be guided by microbial cultures and resistance testing. Surgical management with instrumentation and thorough debridement of the infected disc-space with removing almost all disc-material as well as the cartilage endplate, followed by inserting a cage, bone-substitutes in combination with local antibiotic substances is recommended. Depending on the germ, if detected, vancomycin and gentamycin are the favorite antibiotics. While titanium cages as interbody implant is prefered, there seems to be no significant difference in regard to reinfection with Polyetheretherketone (PEEK) cages [8, 9]. The main goal in treating infections is the elimination of its focus and full restoration of organ function, from conservative treatment through sole revision with decompression to instrumentation with interbody fusion. As such each case needs to be evaluated individually, guided by best clinical practice, considering stability, comorbidities and patient preference among other factors.

Pearls

- Thorough debridement of the infected disc space is the goal of treatment
- Paravertebral abscesses should be drained either surgically or through percutaneous interventions
- When MRI is not possible scintigraphy or SPECT are good alternatives

Pitfalls

- Monotherapy, especially with solely bacteriostatic agents, poses a high risk for resistance occurrence

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