

R. G. Haaker  
M. Senkal  
T. Kielich  
J. Krämer

## Percutaneous lumbar discectomy in the treatment of lumbar discitis

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R. G. Haaker (✉) · T. Kielich · J. Krämer  
Department of Orthopaedics,  
Ruhr University Hospital  
(St. Josef Hospital),  
Gudrunstrasse 56,  
D-44 791 Bochum, Germany  
Tel. +49-234-509 2026;  
Fax +49-234-509 2525

M. Senkal  
Department of General Surgery,  
Ruhr University Hospital  
(St. Josef Hospital),  
Bochum, Germany

**Abstract** Lumbar disc infection, either after surgical discectomy or caused by haematogenous spread from other infection sources, is a severe complication. Specific antibiotic treatment has to be started as soon as possible to obtain satisfactory results in conservative treatment or operative fusion. The aim of this study was to analyse 16 cases of lumbar disc infection, treated with percutaneous lumbar discectomy (PLD) to obtain adequate amounts of tissue for histological examination and microbial culture. Between 1990 and 1994, 26 patients with vertebral osteomyelitis were treated. Sixteen patients, with an average age of 41.4 years (range 14–59 years), underwent a diagnostic PLD. Eight of them showed only moderate changes on computed tomograms (CT scans) and magnetic resonance (MR) images in the initial stages of the disease. The other eight showed more or less extensive osteolytic lesions of one or both vertebral bodies adjacent to the involved

disc. The histology results showed non-specific discitis in nine patients and tuberculosis in one. In two patients an open biopsy had been performed, which showed non-specific discitis. Microbiological analysis revealed specific infection in 45% of the patients. These patients received a specific antibiotic treatment after antibiogram for an average of 33 days. Only three patients were treated surgically, with evacuation of the disc space and interbody fusion; the whole group received a spondylitis brace. All patients obtained satisfactory clinical results at the last follow-up regarding pain, mobility and spontaneous fusion of the involved disc space. In conclusion, PLD is a very helpful minimally invasive procedure in conservative treatment of lumbar discitis.

**Key words** Percutaneous discectomy · Osteomyelitis · Haematogenous spondylodiscitis · Aspiration

### Introduction

With the decrease in the incidence of tuberculous vertebral osteomyelitis, non-specific haematogenous spondylodiscitis has become more important. The differential diagnosis between non-specific spondylodiscitis, tuberculous spondylodiscitis and tumour has implications for the choice between primary surgical procedure and conservative treatment [5, 6, 8, 9].

Diagnostic procedures have been described in the literature: radiography (including CT), scintigraphy and MRI are the most important. MRI, in particular, is able to show the expansion of inflammatory processes into the vertebral canal and soft tissue. Concerning diagnosis, course of disease and duration of therapy, blood sedimentation rate and leucocyte count are the key parameters [3, 4, 10].

According to the literature, the use of a disc biopsy to obtain tissue for histological analysis and culture is very

**Table 1** Level of inflammation in 26 patients with lumbar discitis

Level	No. of patients (n = 26)
T 12/L1	1
L1/L2	2
L2/L3	4
L3/L4	3
L4/L5	11
L5/S1	5

important in choosing between conservative and operative treatment. The traditional approach to management of vertebral infection is to obtain the material by needle biopsy (Yamshidi needle) following the technique described by Valls and co-workers [13]. Yu et al. have published a technique for percutaneous suction aspiration used in two cases of osteomyelitis of the spine [14]. Dufek et al. described an open intervention for biopsy of the disc space. In 32 patients they found *Staphylococcus aureus* in 12 patients, *Staphylococcus epidermidis* in four, and *Pseudomonas aeruginosa* and *Escherichia coli* in two each. All patients were treated surgically [4].

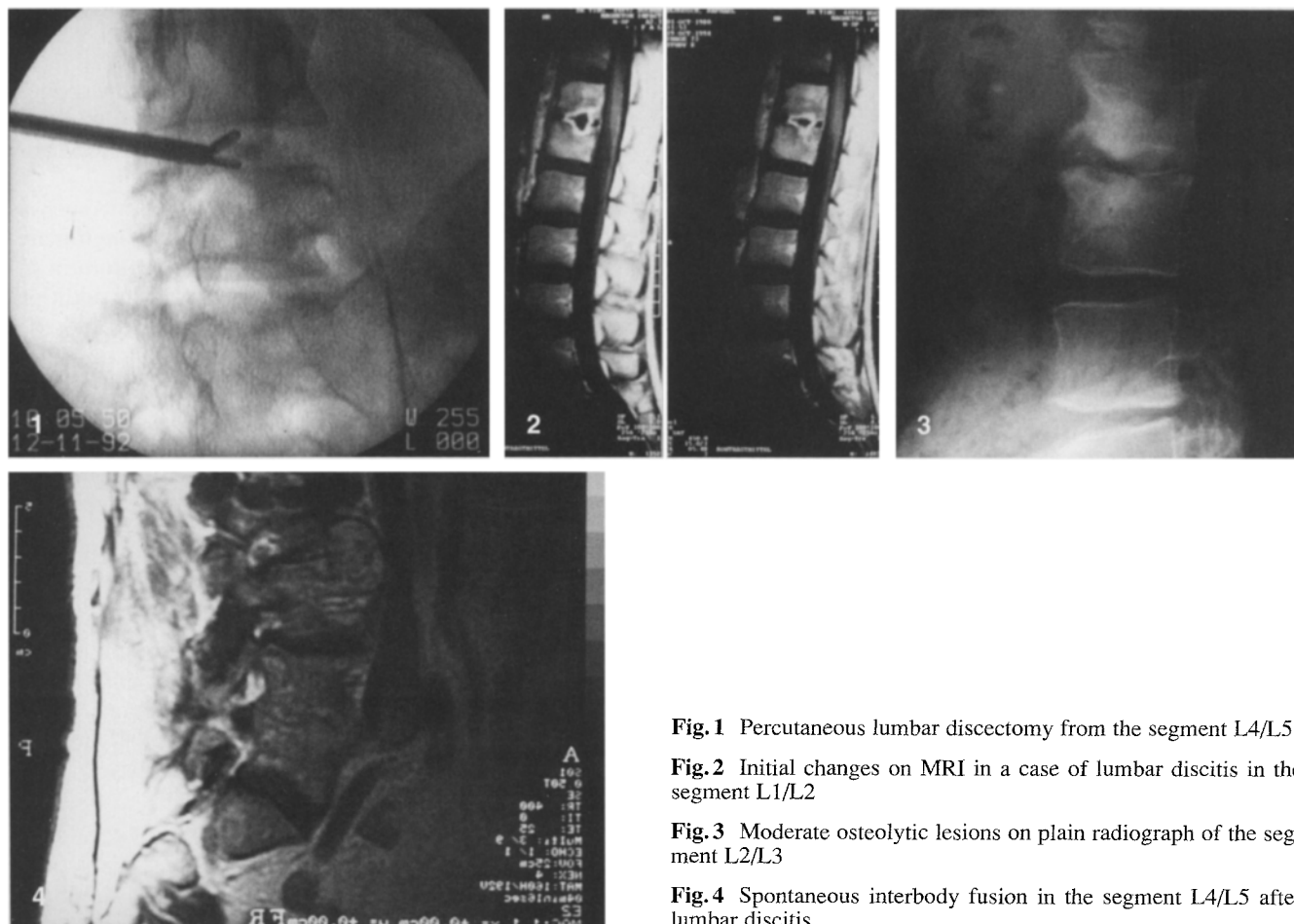
In our department the use of percutaneous lumbar discectomy (PLD) instruments to obtain tissue from the disc space in cases of spondylodiscitis has been common since 1990. The instrument removes disc material by inserting a small forceps into a nucleotome (Fig. 1).

The aim of this survey is to give an overview of 16 cases of discitis that were treated conservatively, most of them after percutaneous excision of infected disc material.

### Patients and methods

Between 1990 and 1994 ten male and six female patients with an average age of 41.1 years (range 14–59 years) were treated at our department for lumbar discitis. The intervertebral disc spaces that were most affected are shown in Table 1.

In all patients the first diagnosis was made on the basis of plain radiography, CT or MRI. In addition, the erythrocyte sedimentation rate (ESR), leucocyte count, and C-reactive protein (CRP) were analysed. Only in five patients was scintigraphy performed. Eight patients showed moderate changes on CT scans and MR images in the initial stages of disease (Fig. 2). In eight patients extensive osteolytic lesions of one or both vertebral bodies adjacent to the involved disc were present (Fig. 3). In all patients the ESR exceeded 70 mm/h and the CRP exceeded 50 U/l.



**Fig. 1** Percutaneous lumbar discectomy from the segment L4/L5

**Fig. 2** Initial changes on MRI in a case of lumbar discitis in the segment L1/L2

**Fig. 3** Moderate osteolytic lesions on plain radiograph of the segment L2/L3

**Fig. 4** Spontaneous interbody fusion in the segment L4/L5 after lumbar discitis

A PLD biopsy was performed after non-specific antibiotic treatment had been administered for an average of 8 days, to prevent occurrence of a fistula (Fig. 1). Between 1 and 2 ccm of infected material and pus was collected by this method from every patient. Fourteen patients were followed-up for a period of 18 months after treatment.

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## Results

In 16 patients with suspected spondylodiscitis a percutaneous instrumented biopsy was performed after initial non-specific antibiotic treatment failed to produce a decrease in pain. In all patients the diagnosis of spondylodiscitis was histologically confirmed.

In these 16 patients the bacteriological findings showed two cases of *Staphylococcus aureus* infection, one case each of infection with *Staphylococcus epidermidis*, *Streptococcus faecalis*, *Corynebacterium* and *Escherichia coli* and one case of tuberculous infection. Nine bacteriological investigations gave non-specific results. The cause of inflammation was surgical treatment (discectomy) in seven cases and haematogenous sowing from other infection sources (e.g., appendectomy, Fig. 2) in nine cases.

After percutaneous instrumented biopsy, a more specific antibiotic treatment based on an antibiogram was continued for a mean period of 33 days. All patients were also treated with a spondylitis brace, including during bed rest. A second surgical intervention (interbody fusion) was necessary in only three patients.

Except for four cases of subcutaneous haematoma, no serious complications occurred after percutaneous disc biopsy. Agranulocytosis caused by the antibiotic treatment (Tazobac) was recorded in two patients. In the follow-up assessment at an average of 18 months after biopsy, the patients showed satisfactory results regarding pain and mobility. One patient showed a complete spontaneous interbody fusion 4 years after PLD treatment and conservative management (Fig. 4).

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## Discussion

Systematic use of needle biopsy has often been advocated in order to select an appropriate antibiotic treatment or to establish the histology of the inflammatory process [1, 12]. However, in a number of cases, needle biopsy has enabled identification of the germ (predominantly *Staphylococcus*, which was found in 33–82% of the patients) and the histology has been positive only in half the cases due to the small amount of material collected. Some authors therefore believe that a biopsy should be performed when-

ever micro-organisms other than *Staphylococcus* are suspected or when there is no evidence of clinical improvement or no tendency towards normalisation of laboratory findings after 3–5 weeks of high-dose antibiotic treatment [10, 11]. This is not a rare situation in conservative management of vertebral osteomyelitis, because systemic antibiotics often cannot reach avascular tissue or pus.

Some studies have even analysed whether the course of infection or the length of antibiotic therapy is affected by the time – how early or late – antibiotic treatment is started [11]. In our opinion, both the commencement of antibiotic treatment (first empirical to prevent septic complications, later on specific) and the histological diagnosis are important for adequate treatment of this disease. Besides securing enough tissue material for microbiological and histological analysis, the major advantage of PLD biopsy is that it partly removes the infected material, which is considered to be very important for successful conservative treatment of lumbar discitis [12, 14]. Recently, operative treatment using anterior interbody fusion with and without instrumentation for lumbar discitis has been reported to shorten the time of treatment and immobilisation [6, 8]. However, there is a high potential risk of pseudarthrosis associated with grafting in the presence of infection as well as difficulties with metal implants in the infected area. In our opinion surgical treatment is indicated in all patients who develop neurological deficits, as well as in the presence of epidural or retroperitoneal abscesses [2, 3, 11, 12]. However, clinical results of patients who are treated conservatively are satisfactory, particularly when vertebral lesions are moderate.

In these cases a minimally invasive technique such as PLD biopsy is a useful procedure to obtain enough material for a histological analysis and bacterial culture in order to perform an adequate antibiotic therapy. In addition, the opportunity to remove some of the infected material may shorten the time of healing with spontaneous interbody fusion.

Instead, when bone destruction is marked, severe back pain may persist for years until spontaneous interbody fusion occurs. In these cases surgical intervention for instrumented or non-instrumented interbody fusion is indicated.

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## Conclusion

PLD biopsy is a minimally invasive procedure for obtaining sufficient biopsy material for histological analysis and culture in cases of vertebral osteomyelitis. The rate of secondary surgical intervention may be reduced if infected disc material is removed by percutaneous biopsy.

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