

# Occult Infections Causing Persistent Low-Back Pain

LESLIE SCHOFFERMAN, MD,\* JEROME SCHOFFERMAN, MD,\*  
JAMES ZUCHERMAN, MD,† HELEN GUNTHORPE, MD,† KEN HSU, MD,†  
GEORGE PICETTI, MD,† NOEL GOLDTHWAITE, MD,\* and  
ARTHUR WHITE, MD\*

**Occult infections caused by indolent organisms may produce persistent back pain that may be difficult to diagnose. The usual findings considered indicative of spinal infection are not reliable in these cases. The authors describe nine patients who presented with occult infections of the lumbar spine. Two of the nine had no antecedent lumbar surgeries nor open wounds. The predominant organisms were diphtheroids and coagulase-negative staphylococci. The diagnosis was established by the clinical course, pathologic tissue changes at surgery, cultures, and response to antibiotic therapy. Normal Westergren sedimentation rates were noted in seven of nine patients, and normal white blood cell counts in six of nine patients. With the exception of two positive computed tomography (CT) scans, one positive gallium scan, and one positive magnetic resonance imaging (MRI) scan, all remaining imaging studies were negative for infection. In many cases, the infection neither was limited to nor involved the disc space. [Key words: infection, lumbar spine, occult infection, diphtheroids, polymicrobial]**

**I**NFECTIONS of the deep tissues of the lumbar spine can cause low-back and/or leg pain and can occur postoperatively. Typically, pain, fever, elevated sedimentation rate and leukocytosis indicate discitis,<sup>2,4,13,15,20</sup> osteomyelitis,<sup>18</sup> postoperative wound infection, or deep tissue infection. When such findings are present, infection is usually due to *Staphylococcus aureus* or other virulent organisms.

We have documented nine cases of chronic, indolent, occult infections with organisms of low virulence that presented as difficult diagnostic lumbar spine problems. In these patients, pain appeared out of proportion to the objective findings, fever was absent or low grade, and sedimentation rates and white blood cell (WBC) counts were usually normal. The organisms responsible were diphtheroids or other low-virulence organisms that are often considered "contaminants."

## METHODS

Patients who were treated for occult infection of the disc or deep tissues of the lumbar spine at a single hospital were reviewed. Between February 1982 and October 1987, occult, indolent infection was diagnosed in nine patients. It became apparent that these patients fit into a distinct clinical pattern. In order to delineate this clinical syndrome, evaluate the usefulness of diagnostic tests, and define the microbiologic characteristics, the charts of these patients

were reviewed retrospectively. Other patients who fit the more typical clinical picture of spinal sepsis, and who were infected with *S. aureus* or other common pathogens, were not included.

Standard laboratory culture techniques were employed using plate media and thiobroth. Anaerobic cultures were done on receipt of specimens in the laboratory. Hooded sterile plating procedures are routine in our laboratory. All cultures were kept for 10 days before being considered negative.

## RESULTS

At the time of exploratory surgery, occult infection was confirmed by the abnormal macroscopic findings and/or pathologic specimens in all nine patients, and microbiologic cultures in eight. The suspected infection was confirmed by microbiologic and/or pathologic specimens obtained at the time of surgery. Discitis was found in three patients, deep soft tissue abscess was found in one patient, and in five patients there were inflammatory changes in deep tissues with fleshy granulation tissue<sup>10,11</sup> adjacent to the disc space. Several of the previously operated-on patients exuded abnormal serous "tissue fluid" similar to, but distinct from, fatty marrow during dissection of the scar tissue or bone.

The occasion at which infection was presumed to occur was laminectomy in six patients (3 of whom had undergone posterolateral fusion) and closed trauma in two patients. One patient had both a laminectomy 17 years before diagnosis and closed trauma 1 year before diagnosis of infection.

All nine patients had chronic low-back and/or leg pain. The average duration of symptoms before diagnosis was 9.5 months. There was a history of chronic low-grade fever in four patients. In two patients, both of whom were diabetic, there was a history of early postoperative wound drainage after their initial procedures.

Computed tomography (CT) scanning was carried out in seven patients and showed no evidence of infection in five. In the two patients with confirmed discitis, the CT scans showed end-plate erosions and narrowing of the disc space.<sup>19,20</sup>

Magnetic resonance imaging (MRI) scan was done in only one patient. This patient had discitis, and the study was consistent with this diagnosis. Technetium bone scan was done in only one patient, also a patient with discitis. Increased uptake at the involved disc space was noted. Gallium scans were done in three patients and were nondiagnostic in all.

Westergren sedimentation rates (WESR) were available for review in seven patients. The value was normal in five. Abnormal elevations were noted in a patient with *E. corrodans* discitis and a patient with an occult chronic abscess.

All nine patients had WBC counts recorded. The WBC count was normal in six. It was elevated in each of the two patients with an elevated WESR and in one additional patient with a mixed diphtheroid and *S. epidermidis* deep tissue infection.

From the \*SpineCare Medical Group, Daly City, California, and the †Spine Center, San Francisco, California.

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The bacterial organisms isolated in these patients are summarized in Table 1. It was observed that it often took 5 to 10 days for the organisms to grow on culture plates. There was one patient whose cultures were negative. This patient had a disc that appeared friable, gray, and grossly infected at the time of surgery and had a positive CT scan showing vertebral end-plate erosions. Five patients had polymicrobial infections, one of whom had two different species of coagulase-negative Staphylococci, each cultured from both blood and deep lumbar tissues. All of the other polymicrobial infections were caused by diptheroids and/or coagulase-negative staphylococcus exclusively.

Of the eight patients with positive intraoperative cultures, four had the same organisms recovered from blood cultures, preoperative aspirations, or in one case, cultures that were obtained when the wound was reopened to allow it to heal by secondary intention.

All patients were treated with intravenous antibiotics (Table 1). The outcomes of treatment are known in eight patients. One patient was lost to follow-up. There was marked improvement in seven of eight patients.

## DISCUSSION

The diagnosis of infection in this series of patients was based on the presence of 1) pathologic tissue changes at surgery, 2) positive cultures, and 3) response to antibiotics in patients with chronic low-back pain that caused disability out of proportion to objective findings.

The commonly recognized infections of the lumbar spine include osteomyelitis, discitis, epidural abscess,<sup>1</sup> and postoperative wound infections. These are well-recognized entities with typical clinical patterns. Discitis occurs after surgery,<sup>4,7,20</sup> after chymopapain chemonucleolysis,<sup>3,21</sup> and after discography.<sup>17</sup> It also may occur by hematogenous spread or local extension. Vertebral osteomyelitis most frequently involves the vertebral end-plate and traverses the disc space. It is thought to be a secondary infection in most patients, with the urinary tract being the most common primary site.<sup>18</sup>

The diagnosis of discitis has a characteristic clinical picture. Typically a patient has severe pain and muscle spasm that occurs immediately after the invasive procedure or after a 7- to 30-day symptom-free interval. The pain severity is disproportionate to other findings.

Imaging studies may show early disc space narrowing followed by vertebral end-plate changes and reactive sclerosis.<sup>12,14,15</sup> Gallium<sup>10,11</sup> and technetium bone scans<sup>12</sup> can be positive. Magnetic resonance imaging changes can occur in as little as 9 days in patients who have developed discitis after discography.<sup>9</sup> The WESR has been reported to be elevated in virtually all patients with discitis.<sup>4,7,13,20</sup> This may be in part an artifact of the elevation of the WESR that usually occurs in the postoperative period.<sup>5,6</sup>

Adult discitis usually presents as an acute infectious process caused by *S. aureus* or other commonly recognized pathogens. In contrast, our three patients with discitis presented with an indolent and chronic form that was not originally considered as the cause of low-back pain. In these patients, the quality and degree of pain was similar to the pain of other patients with persistent postoperative back pain or chronic back pain of unknown etiology. This clinical picture differs considerably from the severe and acute pain of the usual patient with discitis. In two of our patients the discitis followed closed trauma. One was infected with *E. corrodans* and the other with *S. epidermidis*.

Deep tissue infection that did not directly involve the disc space occurred in six patients. These patients had chronic, indolent infection that involved the deep tissue planes adjacent to the disc space. The clinical presentation was the same as the three patients with discitis described above, which, as noted above, differs from that seen with the more common acute suppurative postoperative deep tissue infections.

Computed tomography scans did not suggest deep tissue infection. However, granulation tissue and fibrosis were often present and would be difficult to distinguish from the type of inflammatory tissue seen at surgery in these patients. Too few patients had MRI, gallium, or technetium scans to assess the value of these tests.

Table 1. Bacteria, Culture Sight, and Treatment Protocols in Patients with Occult Lumbar Infection

Patient	Bacteriology		
	Bacteriology	Culture sight	Treatment
1.	Culture negative	*Operative swab	Kefzol 1 gm IV every 6 hours 12 days Keflin 1 gm IV every 8 hours 12 days Keflex 500 mg four times a day by mouth 14 days Vanomycin IV 6 weeks
2.	Diptheroid <i>S. Epidermidis</i>	Operative swabs	Penicillin 2 mil units IV every 4 hours 4 weeks
3.	Diptheroid	Initial operative culture and reexploration	
4.	<i>S. Epidermidis</i>	*Needle biopsy disc and operative culture of discal space	Kefzol 1 gm IV every 8 hours 33 days Keflex 500 mg four times a day by mouth 14 days
5.	MRSA <i>S. Haemolyticus</i>	Epidural abscess	Nafcillin 2 gms IV every 4 hours 24 days Cefazolin 1 gm every 8 hours 18 days
6.	<i>S. Epidermidis</i> Propionobacter acne	Operative cultures	Penicillin 2 mil units IV every 4 hours 4 weeks
7.	<i>S. Hominis</i> <i>S. Warneri</i>	Operative cultures and blood cultures	Not documented
8.	Diptheroid Coag neg staph	Operative cultures	Penicillin 2 mil units IV every 4 hours 15 days
9.	<i>Elkenella corrodans</i>	*Closed and open disc biopsy	Nafcillin 1 gm IV every 4 hours 8 days Penicillin 2.5 mil units IV every 4 hours 4 weeks PCN 500 mg four times a day by mouth + Benemid 14 days

Totals: Polymicrobial, 5; Diptheroid, 1; Coagulase Negative staph., 1; *Elkenella corrodans*, 1; Culture negative, 1.

\*Documented discitis.

The usual parameters of inflammation such as WESR and WBC counts also were of little value in this group of patients. These observations make the clinical suspicion of infection even more important.

The paucity of clinical, laboratory, and radiographic findings of sepsis is consistent with the nature of the bacteria cultured. Most of these indolent infections were caused by low-virulence organisms. The diptheroid and coagulase-negative staphylococci are normal skin flora. Therefore, these organisms often are considered to be contaminants and not clinically important when isolated.<sup>8,16</sup> These slow-growing organisms often took 5 to 10 days to grow in laboratory cultures. This might also account for the chronicity of the clinical course.

Polymicrobial infection occurred in five of the six cases of deep tissue infections (Table 1). Polymicrobial infections have been reported in vertebral osteomyelitis and epidural abscesses.<sup>1,18</sup>

The fact that the identical organism(s) was recovered in the same patient twice in four of nine patients supports the clinical and pathologic evidence of infection.

The results of therapy were gratifying. There was marked improvement in seven of the eight patients available for follow-up. It is our impression that these infections should be treated with a minimum of 4 to 6 weeks of intravenous antibiotics. It has been suggested that there is a better outcome, which is statistically significant, in patients with discitis who are treated for more than 4 weeks when compared with those treated for less time.<sup>18</sup>

The favorable clinical outcome may have been influenced by the fact that coexistent spinal pathology was noted and corrected at the time of surgery in six of nine patients.<sup>22</sup> In four of these patients, there was mild to moderated foraminal stenosis, which before surgery was thought to be of minimal clinical significance. The other two patients had discectomies performed for degenerated discs. However, in three of the patients who improved, no pathologic lesion other than infection was recognized.

This report presents a group of patients who presented with persistent postoperative pain or chronic back pain without a clear etiology who were shown to have occult infections of the lumbar spine. The low virulence of the infecting organisms made diagnosis difficult. Westergren sedimentation rate and imaging studies may not suggest the diagnosis. The clinician must work closely with the laboratory to assure proper reporting of the organisms so that low-virulence organisms are not dismissed as contaminants. The cultures must be held for 10 days before being considered negative.

These cases were not typical of discitis, vertebral osteomyelitis, or epidural abscess: we believe they are usefully described as occult deep tissue infections. The diagnosis of chronic indolent infection should be considered in all patients with persistent back pain, either postoperatively or not, which appears to be out of proportion to objective findings, especially in the presence of low-grade fever or other constitutional symptoms.

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Address reprint requests to

Leslie Schofferman, MD  
SpineCare  
1850 Sullivan Avenue  
Daly City, CA 94015

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