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Review

Discitis after Lumbar Epidural Corticosteroid Injection: A Case Report and Analysis of the Case Report Literature

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ABSTRACT

Objective. The primary objective is to document the first case report of discitis after a lumbar epidural corticosteroid injection. The second objective is to analyze the case report literature to identify clinical features and trends of patients with infectious complications after spinal injections.

Design. Single case report. A MEDLINE and EMBASE literature search was conducted using key words from the names of commonly performed spinal procedures, including epidural corticosteroid, selective nerve root, transforaminal epidural, facet joint, and sacroiliac joint injections.

Setting. Pain medicine clinic at a tertiary medical center.

Patient. A 64-year-old man with an 8-year history of left lower extremity radicular pain and recurrent pulmonary infections was referred for a lumbar epidural corticosteroid injection. Six weeks following the injection, the patient returned with a 4-week history of worsening right-sided paraspinous pain without associated recurrent pneumonia. Magnetic resonance imaging revealed a right-sided L5-S1 disc extrusion with discitis and a right L5-S1 discectomy was performed. Cultures of disc material and blood showed growth of coagulase-negative *Staphylococcus*, and a transesophageal echocardiogram showed no evidence of endocarditis. The patient received 6 weeks of intravenous antibiotics and he had symptomatic recovery at 3-month follow-up.

Results. Including our patient, the literature search identified 27 case reports of infectious complications. Similar clinical features and significant trends were evident in five categories including predisposing factors, symptom presentation, diagnostic evaluation, etiological organisms, and treatment outcomes.

Conclusions. The identified clinical features and trends could prove useful to the practitioner when an infectious complication is suspected or has occurred.

Key Words. Discitis; Epidural Corticosteroid Injection; Infection; Complication

Introduction

Infectious complications are rare following commonly performed spinal injections including epidural corticosteroid, selective nerve root, transforaminal epidural, facet joint, and sacroiliac joint injections [1]. The incidence of these complications remains undetermined. In an extensive review of the case report literature, only one report of discitis was identified [2]. This particular complication occurred after a single caudal epidural corticosteroid injection. Herein, we submit the first reported occurrence of discitis following a lumbar epidural corticosteroid injection

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for lower extremity radicular pain. Important features of our patient will be compared with the case report literature to further characterize the course of these rare but devastating complications.

Case Report

A 64-year-old man was referred for a lumbar epidural corticosteroid injection with an 8-year history of left lower extremity radicular pain. Past medical history was remarkable for chronic obstructive pulmonary disease with recurrent pulmonary infections and a left humerus fracture that required endoprosthesis placement 6 years prior. Two bronchoscopies were performed at 10 and 6 months prior to evaluation at our pain medicine clinic. Culture of bronchoalveolar lavage material was significant for *Candida albicans.* Due to the history of recurrent pulmonary infections, the patient underwent an extensive series of evaluations at our clinic 10 weeks prior to the epidural injection. These evaluations included general medical, pulmonary, neurological, and physiatry consultations. Physical and neurological examination was remarkable for four out of five weakness in the left hamstrings, five out of five right-sided strength and absent ankle reflexes bilaterally. Spine flexion, extension, and paraspinal soft tissue palpation were nonirritating. No new or recurrent pulmonary infection was diagnosed. An electromyogram, performed due to a history of left lower extremity radicular pain, showed findings of an uncompensated left L5 radiculopathy. No spine radiographs or magnetic resonance images (MRIs) were obtained.

Four weeks prior to the epidural injection, an orthopedic surgery consultation was obtained due to left shoulder pain. Surgical revision of the left humerus endoprosthesis was under consideration and peroperative laboratory tests, including a C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), were obtained. These tests were obtained to screen for occult infection of the endoprosthetic device. The CRP was 0.138 mg/dL (reference range, <0.4 mg/dL) and the ESR was 2 mm/h (reference range, 0–22 mm/h).

On presentation to the pain medicine clinic, the patient reported persistent left lower extremity radicular pain unchanged in intensity or distribution since the previous series of medical evaluations. Physical examination was also unchanged. Following informed consent, an interlaminar epidural injection was performed using aseptic precautions that included povidone-iodine skin preparation that was allowed to air dry, application of sterile skin drapes, and use of sterile gloves and face masks by all personnel. Using fluoroscopic guidance, a 20-gauge Tuohy needle was inserted into the L5-S1 interspace. The epidural space was identified by loss of resistance and confirmed by epidural spread of contrast material in both the anterior–posterior and lateral fluoroscopic views. Triamcinolone 80 mg in 6 mL of 0.5% lidocaine was administered. The stylet was reinserted and the needle removed.

Six weeks following the injection, the patient returned reporting 4 weeks of worsening right-sided paraspinous, buttock, and thigh pain without associated fever, chills or nocturnal diaphoresis. During the intervening time period following the epidural injection, the patient had not undergone any medical or dental procedures and had not been treated for a pulmonary infection or any other infectious disease process. The patient was unable to walk due to pain severity and was emergently hospitalized. On admission, he was febrile and new findings on physical examination included right lumbosacral paraspinal tenderness and an absent right patellar reflex. A chest radiograph showed no evidence of an acute pulmonary infection and the ESR and CRP were 82 mm/h and 17.4 mg/L, respectively. Blood and urine cultures were obtained. Magnetic resonance imaging of the lumbar spine with and without intravenous contrast revealed a right-sided disc extrusion with superimposed vertebral body edema and inflammation at the L5-S1 interspace. A T2 sagital image of the lumbar spine showed posterior extrusion of disc material or possible anterior epidural space phlegmon with resultant severe spinal stenosis (Figure 1). A neurosurgical consultation was obtained and the patient underwent a right L5-S1 discectomy, complete L5 laminectomy, and bilateral medial facetectomies at L5-S1. Disc material at the level of the nucleus pulposis was frankly purulent and a specimen was sent for culture. Culture of the disc material showed growth of coagulase-negative *Staphylococcus*. Blood cultures obtained preoperatively grew coagulase-negative *Staphylococcus*. Urine culture showed no growth, and a transesophageal echocardiogram showed no evidence of endocarditis. The patient received no preoperative antibiotics.

A 6-week course of intravenous vancomycin was initiated, and the patient was dismissed to a

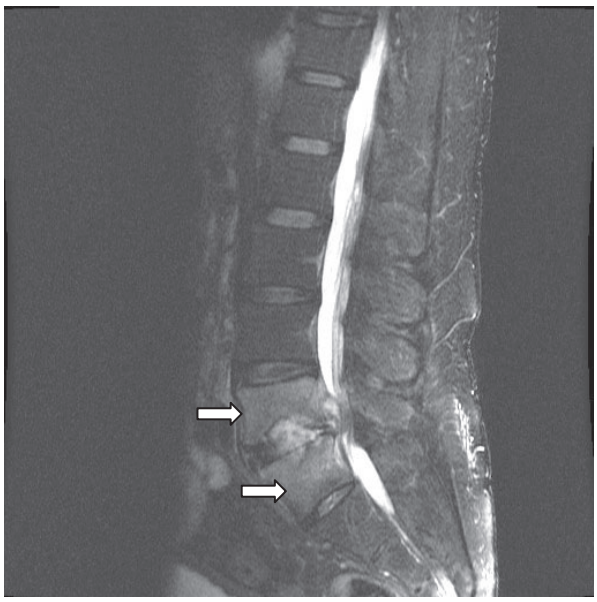

Figure 1 A T2 sagital magnetic resonance image of the lumbar spine showing endplate and vertebral body T2 hyperintensity due to edema and interspace inflammation at L5-S1 (arrows) with severe spinal stenosis from either posterior extrusion of disc material or anterior epidural space phlegmon.

skilled nursing facility on postoperative day 18. At 3-month follow-up, the patient reported no lumbosacral or lower limb pain and lower extremity strength testing was normal.

Methods of Literature Search and Data Analysis

A MEDLINE (1966–2004) and EMBASE (1980–2004) literature search was conducted using the Ovid software program. Pertinent key words from the commonly used name of each procedure were searched, including epidural corticosteroid, selective nerve root, transforaminal epidural, facet joint, and sacroiliac joint injections. The results of each key word search were combined with the search results of the subject heading for the word infection. The final search results were reviewed and all relevant manuscripts were retrieved. The bibliographies of identified manuscripts were searched for additional reference sources. The literature search produced 19 case reports of infectious complications after epidural corticosteroid injections [2,3–20], four reports after facet joint injections [21–24] and one report each after transforaminal epidural [25], selective nerve root [26] and sacroiliac joint [27] injections. The frequency of pertinent clinical variables were compared using Fisher's exact test with a 0.05 two-sided significance level.

Discussion

To our knowledge, this is the first report of discitis following a lumbar epidural corticosteroid injection. The clinical course, treatment, and outcomes of spondylodiscitis have been well described in several recent studies [28,29]. However, a comparison of our patient's course to these related but different patient groups could obscure important clinical features evident among patients with spinal pain who have been treated with spinal injections. Excluding discography, the majority of information pertaining to infectious complications after spinal injections is contained in the case report literature. Despite the lack of larger case series, important trends were evident in five broad clinical categories, including predisposing factors, symptom presentation, diagnostic evaluation, etiological organisms, and treatment outcomes. The course of our patient with discitis was compared with the case report literature of infectious complications after commonly performed spinal procedures to identify the important clinical features of these rarely reported complications.

Potential risk factors for an infectious complication in our patient included a history of recurrent pulmonary infections. Prior to the epidural injection, the patient had no clinical signs or symptoms of a concomitant pulmonary infection, making hematologous spread from a distant site an unlikely source of inoculation. While the absence of discitis was not radiographically verified before the epidural injection, the normal CRP and ESR test results obtained 1 month prior provided indirect evidence that the patient did not have an unrecognized discitis at the time the procedure was performed. However, in patients with a history of recurrent infections, a preprocedural MRI may be warranted regardless of the patient's physical examination findings or laboratory test results. In this unique patient population, a preprocedural MRI would further establish the patient's adequacy for undergoing a procedure by identifying an occult infection and would serve as a comparison study when subsequent imaging is needed for the assessment of an infectious complication. In the single report of discitis after a caudal epidural injection, the patient was a 73-year-old woman with a history of chronic "mechanical" low back pain, neurogenic claudication, and diabetes mellitus [2]. Including our patient and the previous case report of discitis, 20 infectious complications following interlaminar or caudal epidural corticosteroid injections were identified of which

15 received lumbar epidural injections [3–6,9–12,14–20] and two received caudal injections [2,12]. Considering these 17 patients, the infectious complications included epidural abscesses [5,9,12,14–18], epidural abscesses with meningitis [3,6,19], intradural abscesses [10,20], meningitis [4,11], and discitis. Including our case report, 11 patients had a history of diseases or were taking medication that impaired immune function, including diabetes [2,5,6,12,15,16], metastatic cancer [3,9], neutropenia [19], oral steroid use [18], and previous infections [6]. In the group of six patients with diabetes, one had a myloproliferative disorder [15], one was asplenic [16], and one had a history of *S aureus* sepsis [6]. Furthermore, the immune status of these patients could have been further compromised by the systemic effects of the depot corticosteroid [30]. Compared with patients who had infectious complications after facet joint, selective nerve root, transforaminal epidural or sacroiliac joint injections, patients who had an infectious complication after an interlaminar or caudal epidural injection were more likely to be immunocompromised ($P = 0.02$). All patients, regardless of injection type, were administered a depot corticosteroid [2–27].

Our patient, who had a longstanding history of left lower extremity radicular pain, developed right-sided low back pain 6 weeks following the lumbar epidural injection. Physical examination revealed new onset paraspinous tenderness and neurological deficits. In the previous report of discitis, the patient reported "transient" symptomatic improvement but pain intensity worsened over the ensuing 4 weeks [2]. Including our patient, the median time to symptom onset in patients who had an infectious complication after a spinal injection was 7 days (75% interquartile range 21 days). In this group of 27 patients, the predominant presenting symptoms included worsening spinal or extremity pain [2,10–12,14,15,17,19,21,22,24–27], worsening pain in addition to neurological deficits [5,6,8,9,13,18,20,23] including our patient, and neurological deficits only [3,16]. These three groups of symptoms comprised 25 of 27 (92%) patients who had an infectious complication. The predominant symptoms in the remaining two patients were nuchal rigidity, fever, and chills where one was diagnosed with meningitis [4] and the other with a cervical epidural abscess [7]. The neurological deficits for all patients included a combination of extremity weakness, sensory loss or bladder dysfunction [6,9,13,18,20,23], paraplegia [5], and quadriplegia [8].

The ESR and CRP in our patient and the previous case report of discitis [2] were elevated and the diagnosis was established by MRI. Including our report, an ESR, CRP or both were elevated in nine of 10 patients in which these tests were obtained [2,6,10,12,14,15,21,27]. The CRP was not elevated in an asplenic diabetic patient diagnosed with an epidural abscess [16]. The median value for the ESR and CRP was 95 mm/h (75% interquartile range 100 mm/h) and 8 mg/dL (75% interquartile range 17 mg/L), respectively. Except for a case report of meningitis [4], the diagnosis of an infectious complication was established by computerized tomography (CT) and myelogram in case reports published between 1966 and 1993 [3,5–8]. From 1993 to 2004, MRI was used to establish the diagnosis [2,9,10,13–25,27], except for a single report in 1996 where only CT was used [11]. In one patient with a history of diabetes who presented with an epidural abscess, the MRI was "inconclusive" and the diagnosis was established at the time of surgery [12].

The etiological organism cultured in our patient was coagulase-negative *Staphylococcus*. In the previous report of discitis, a culture of disc material grew *Pseudomonas aeruginosa* [2]. Inoculation of the paraspinous tissues with residual cutaneous flora has been proposed as a source of infection in patients undergoing spinal procedures [31]. This was the presumed pathway of inoculation for the infectious complication reported herein. In a rat model of discitis where the intervertebral discs were inoculated with either *S aureus*, *Klebsiella pneumoniae* or *P aeruginosa*, vacuolar myelopathy and neuropathy was demonstrated in the spinal cord and nerve roots, respectively [32]. The histopathological changes were most severe in the *S aureus* animal model. The vacuolization of neural tissue was postulated to be an immune-mediated response to infection that may be in part responsible for the pain and neurological symptoms of discitis. Including our patient, an etiological organism was cultured or identified in 22 of 27 (81%) patients who had an infectious complication after a spinal injection. Staphylococcal species, including *S aureus* [5–7,9,11,12,18,19,21,22,24,27], multidrug resistant *S aureus* [13,14,25], and *S epidermidis* [23], were cultured from blood, cerebral spinal fluid (CSF), or purulent material. The remaining organisms included Gram-positive cocci identified on CSF Gram stain [4], beta-hemolytic streptococci cultured from purulent epidural material [15], and *Aspergillus fumigatus*, which was cultured from an

Table 1 Clinical features of patients with infectious complications after spinal injections including current case report

Clinical Domain	Clinical Features	Number (N = 27) of Patients (%)
Predisposing factors	Use of long-acting corticosteroid in injectate	27 (100)
	Any epidural injection	20 (74)
	Lumbar or caudal epidural injection	17 (63)
	History of impaired immune function	11 (41)
Symptom presentation	Median time to symptom onset after last injection (75% interquartile range 21 days)	7 days
	Worsening spinal or extremity pain	14 (52)
	Worsening pain plus neurological deficits	9 (33)
	Neurological deficits only	2 (7)
Diagnostic evaluation	Elevated ESR or CRP	9 of 10 (90)
	Diagnosis established by MRI	18 of 19 (95)
Etiological organism	Etiological organism identified	22 (81)
	When organism cultured, staphylococcal species identified	17 of 22 (70)
Treatment and outcome	Symptomatic recovery for all patients	13 (48)
	Surgical treatment	19 (70)
	Symptomatic recovery after surgery	8 of 19 (42)
	Medical treatment	7 (26)
	Symptomatic recovery with medical treatment	5 of 7 (71)

ESR = erythrocyte sedimentation rate; CRP = C-reactive protein; MRI = magnetic resonance image.

intradural abscess [20]. In one patient, the reported infectious complication was reactivation of genital herpes simplex virus-2 after bilateral S1 selective nerve root injections [26]. An etiological organism was not identified in five patients. Negative culture results were attributed to use of antibiotics prior to obtaining culture material in the case report by Shealy [3], and the occurrence of a neuropathologically confirmed "aseptic" epidural abscess was the stated reason for negative culture results in the report by Sabel et al. [16]. An explanation for negative culture results was not provided in two reports [10,17], and no cultures were obtained in the case report by Bromage [8].

An extensive spinal operation was required in our patient where symptomatic recovery was documented at 3-month follow-up. Conversely, in the previous report of discitis, the patient did not require an operation and was successfully treated with a 6-week course of intravenous antibiotics [2]. At 5-month follow-up, the patient's clinical symptoms had reportedly "resolved." In case reports where treatment and outcomes were documented, the majority of patients were treated surgically [3,5–10,12–14,16,17,20,21,23–25,27]. However, more than one half of these surgically treated patients had persistent neurological deficits [3,5–7,9,11,15,16,23] including one patient with paraplegia [12] and one with quadriplegia [8]. Three patients who were immunocompromised died during the course of treatment [3,6,9]. When all infectious complications were considered regardless of the injection type, including our case report, immunocompromised patients were more likely to have a fatal outcome compared with patients who were not immunocompromised ($P = 0.05$). Seven patients were treated medically of which five had symptomatic recovery [2,4,18,19,26]. One patient with meningitis developed cauda equina syndrome [11], and one patient treated with percutaneous drainage and antibiotics had a persistent sensory deficit [15].

The clinical features of infectious complications after spinal injections have been summarized in Table 1. The epidemiological and clinical findings from this small group of disparate case reports should be interpreted with caution. When immunocompromised patients are undergoing evaluation for a spinal injection, specifically an interlaminar epidural injection, antibiotic prophylaxis for staphylococcal species should be considered. A preprocedural MRI should be obtained when treating patients with a history of recurrent infections to assess for an occult infection and to use as a comparison study if the patient subsequently develops symptoms of an infectious complication. In patients who present with worsening pain or neurological deficits following an injection, an infectious complication should remain paramount in the differential diagnosis. While an ESR or CRP may be useful screening tests in symptomatic patients, an MRI should be obtained to establish a definitive diagnosis. If an infectious complication has been diagnosed, an etiological organism, most commonly a staphylococcal species, can be identified in the majority of patients. However, despite treatment, more than one half of patients did not fully recover, and immunocom-

promised patients may be at higher risk of death. The clinical features and trends identified herein could prove useful to the practitioner and expedite patient care when an infectious complication is suspected or has occurred.

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