A Clustering of Epidural Abscesses in Chronic Hemodialysis Patients: Risks of Salvaging Access Catheters in Cases of Infection

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ABSTRACT

The objective of this study was to investigate factors that might increase the risk of epidural abscesses in hemodialysis patients. The charts of all hemodialysis patients presenting with an epidural abscess over a period of 5 yr at Duke University Hospital and the Durham Veterans Administration Medical Center were reviewed for patient demographics, months on dialysis, vascular access, recently treated infections, signs and symptoms at presentation, and results of any surgical intervention. Ten patients developed an epidural abscess during a 5-yr period. Severe, debilitating back pain was the only consistent initial complaint. Eight patients had dual-lumen intravenous catheters for hemodialysis access, and five patients had or were receiving parenteral antibiotics for catheter salvage. There were no consistent physical, clinical, or laboratory findings. Surgical drainage of the abscess with removal of the hemodialysis catheters and parenteral antibiotics were required for cure in six patients. It was concluded that attempts at catheter salvage with parenteral antibiotics has significant risks for complications. Hemodialysis patients with recently treated or ongoing bacteremia who complain about severe and debilitating back pain with or without neurologic findings should raise the suspicion of an occult epidural abscess.

Key Words: Catheter salvage, back pain, paralysis, bacteremia, temporary catheters

Spinal epidural abscess is an uncommon but serious medical problem. The estimated incidence is only 0.2 to 1.2 cases per 10,000 admissions to tertiary care centers (1). It has been suggested that the frequency of this problem is increasing with the growing use of invasive procedures (2). The published data on the occurrence of epidural abscesses in hemodialysis patients are scant. Kolmos in 1979 (3) described two patients who developed epidural abscess. Eleven years later, Hlavín et al. noted that only five of 40 patients in her series of epidural abscesses over a 10-yr period were on hemodialysis (4).

During the period of 1987 to 1990, when our dialysis system underwent rapid expansion from roughly 100 patients to 280, there were no cases of epidural abscesses noted. Coincident with the initiation of dual-lumen cuffed catheter use for hemodialysis access 5 yr ago and the growth of our dialysis patient population to 400, we have noted a clustering of epidural abscesses in our hemodialysis patients. We report our experience with this devastating complication and discuss the English-language literature on the topic.

METHODS

The charts of all hemodialysis patients with a spinal epidural abscess treated at Duke University and Durham Veterans Administration Medical Centers (VA MC) over the last 5 yr were reviewed. Information concerning clinical presentation, associated diseases, laboratory values, clinical course, and outcome were abstracted by one physician. Cases were defined as acute if symptoms were present for 2 wk or less before presentation (4). In addition, the English-language literature from 1965 to 1995 was searched with Index Medicus by use of the terms "epidural abscess," "osteomyelitis," and "hemodialysis." Pertinent references before 1965 cited in selected papers were also reviewed. Data are presented as means ± SD.

RESULTS

Ten hemodialysis patients who received their dialysis treatments at a Duke University-affiliated or Durham VA MC dialysis unit developed an epidural abscess over a 5-yr period. The patient characteristics are summarized on Table 1. The mean age at presentation was 66.1 ± 13.1 yr, with a range of 46 to 85 yr. Patients had been on renal replacement therapy for a mean of 20.9 months ± 20.6 months (range, 2 to 58 mo). Seven patients were female, and nine of the ten had diabetes mellitus. All but two patients dialyzed via a dual-lumen catheter (Perm cath or Vas cath; Quinton Instrument Co., Seattle, WA). The remaining two pa-
TABLE 1. Characteristics of 10 hemodialysis patients with epidural abscesses\(^a\)

<table>
<thead>
<tr>
<th>Patient</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Sex, Age</td>
<td>M, 46 yr</td>
<td>F, 85 yr</td>
<td>F, 62 yr</td>
<td>F, 59 yr</td>
<td>F, 68 yr</td>
<td>F, 71 yr</td>
<td>F, 48 yr</td>
<td>M, 72 yr</td>
<td>F, 84 yr</td>
</tr>
<tr>
<td>Months on Dialysis</td>
<td>2.5</td>
<td>12</td>
<td>8</td>
<td>38</td>
<td>36</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>3.5</td>
</tr>
<tr>
<td>Access</td>
<td>PC</td>
<td>PC</td>
<td>PTFE</td>
<td>PTFE</td>
<td>VC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>VC</td>
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<td>Recent Bacteremia</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Antimicrobials on Presentation</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Back Pain</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Neurologic Deficit</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Fever</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>WBC (K/mm(^3))</td>
<td>9</td>
<td>15.2</td>
<td>6.1</td>
<td>7.9</td>
<td>7.3</td>
<td>7.3</td>
<td>Not</td>
<td>14</td>
<td>28.6</td>
</tr>
<tr>
<td>Spinal Level</td>
<td>T10-12</td>
<td>T7-8</td>
<td>L3-5</td>
<td>L3-4</td>
<td>C2-5</td>
<td>L5-S1</td>
<td>T8</td>
<td>C3-4</td>
<td>L2-4</td>
</tr>
<tr>
<td>Blood Culture</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Abscess Culture</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Organism</td>
<td>MRSA</td>
<td>MRSA</td>
<td>Coagulate negative</td>
<td>None isolated</td>
<td>MRSA</td>
<td>MSSA</td>
<td>MSSA</td>
<td>MSSA</td>
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</tr>
</tbody>
</table>

\(^a\) PC, Perm cath; PTFE, polytetrafluorethelene; VC, Vascath; MRSA, methicillin-resistant S. Aureus; MSSA, methicillin-sensitive S. Aureus.

Patients dialyzed via a polytetrafluorethelene graft. During the period of study, 13% of our dialysis population at any given time were being dialyzed via dual-lumen catheters. Thirty-nine percent of catheters caused infections. In 61% of the patients, attempts were made to salvage the catheters. Five of the eight patients with dual-lumen catheters in place at presentation had recent (within 3 mo) bacteremia with a Staphylococcus species for which efforts had been made to treat the bacteremia or febrile episode without catheter removal. The Staphylococcus species in these five patients were coagulate-negative in two patients and resistant to methicillin in two of the three patients with Staphylococcus aureus. Each patient received 2 to 4 wk of weekly intravenous vancomycin therapy (because of ease of dosage) at doses of 1 to 1.5 g to maintain serum levels in the therapeutic range.

Staphylococci were isolated at the time of surgery or aspiration from the epidural abscesses of six patients. The Staphylococci were coagulate-negative in three patients and resistant to methicillin in two. Three of the five patients in whom an organism had been isolated during the previous episode of bacteremia demonstrated the same organism in their epidural abscess with similar sensitivities. One patient (Number 4), who was treated for a febrile episode during dialysis with previously negative blood culture, had negative cultures from her epidural abscess and repeat blood cultures during her hospitalization.

All but one of the patients had severe back pain at presentation; however, only four had fever or an elevated white blood cell count. Six patients presented acutely (4). Three of these had clinical evidence of spinal cord compression; two with mild lower-limb weakness and paresthesia and one with flaccid paralysis and anesthesia below the umbilicus.

Plain films of the spine showed either loss of disk space or vertebral compression fractures (Figure 1, left panel). Table 1 outlines the levels at which the abscesses developed: two developed in the cervical spine, three in the thoracic spine, and five in the lumbar spine. Nine of ten patients had magnetic

Figure 1. Left panel: plain radiograph, lateral view of Patient 1 showing disk-space destruction at T-12 L-1. Right panel: sagittal MRI view with gadolinium contrast of the spinal column and cord of Patient 1. Note compressed cord (A, both panels), epidural abscess (B, right panel), and destruction of the T-12 vertebral body (C, right panel).
resonance image (MRI) findings consistent with diskitis or osteomyelitis with epidural abscess (Figure 1, right panel). One patient's MRI was initially reported as consistent with metastatic disease caused by an undiagnosed malignancy; an epidural abscess was diagnosed during a surgical biopsy to obtain a histologic diagnosis of cancer.

Six patients were treated with open surgical drainage, and 4 to 6 wk of intravenous vancomycin. Neurologic function improved after surgery in two of the three patients who presented with neurologic impairment but did not return to baseline. The remaining four patients were treated with antibiotics alone because of high surgical risk or the small size of the abscesses. Vancomycin was the antimicrobial agent of choice because of its ease of dosage for outpatient therapy. Inpatients were dialyzed with cellulosic membranes and outpatients with either cellulose or polysulfone membranes. Antibiotic dosing was modified to maintain therapeutic levels.

DISCUSSION

Maintenance hemodialysis requires long-term reliable vascular access to the circulation (5, 6). Currently, these requirements are primarily met by synthetic grafts and native arteriovenous fistulae (5, 6). Recently, dual-lumen cuffed hemodialysis catheters have assumed an increasing role in providing long-term vascular access (7-9). These catheters now account for approximately 10 to 15% of hemodialysis access in most dialysis facilities in the United States (10). They are extraordinarily useful in patients for whom there are no otherwise suitable remaining access sites or for whom the cardiovascular effects of a fistula are judged unacceptable, or as a temporary measure while waiting for a native fistula to mature (5). The major drawback to the use of these catheters is the frequent development of bacteremic episodes necessitating their removal (5). In recent years, efforts have been directed toward salvaging access catheters in cases of infection by using parenteral antibiotics (10). The price for catheter salvage with prolonged antibiotic therapy in terms of endocarditis, osteomyelitis, and other metastatic infections is not known.

Estimates of the rate of catheter infections vary somewhat. Moss et al. reported a 7% incidence of catheter removal secondary to unresolved bacteremia (11), whereas Shaffer et al. removed 23% of Permcathe in their study because of unresolved exit-site infections or bacteremia (12). In that regard, there are scant published data concerning efficacy of catheter salvage in hemodialysis patients with bacteremia and/or presumptive catheter infection. Capdevila et al. (13) reported in a prospective study the successful treatment and presumed eradication of 13 cases of Permcathe-related infections without catheter removal. In their discussion, they state that no firm recommendations should be established for trying to save a catheter, because decisions must be made on a patient-by-patient basis. Swartz et al. reported eradicating 31% of catheter infections with aggressive and prolonged (greater than 2 wk) antibiotic therapy without catheter removal (14). In all successfully treated patients, the infections were caused by Gram-positive cocci, whereas other organisms were refractory to antibiotic therapy alone and required catheter removal. Although studies such as those by Capdevila et al. (13) and Swartz et al. (14) provide support for attempts at salvaging catheters in cases of infection by using prolonged antimicrobial therapy, the complications of the widespread application of such a strategy are not known.

Our findings suggest that attempts at catheter salvage with parenteral antibiotics may be associated with severe complications. Of the ten patients with a spinal epidural abscess reported here, eight were being dialyzed with dual-lumen catheters (six of these were cuffed catheters) at the time of abscess diagnosis (five of the patients were recently treated with an extended course of parenteral antibiotics for line infection with the hopes of salvaging their catheters). Nonspecific back pain was the most common and important symptom in our patients. The pain was often excruciating, requiring large doses of narcotics for relief. Although in some of the patients the pain was exacerbated by breathing or was associated with neurologic deficits, symptoms were less specific than those for the four phases that typically describe the clinical presentation of a spinal epidural abscess (spinal ache, root pain, weakness of voluntary muscles/splinectors/sensibilities, and, finally, paralysis) (15). The usual markers for infection (fever, leukocytosis) were present in a minority of patients. Plain spinal x-rays, when done, revealed bone or disk-space destruction. Given the availability of MRI, it should be the diagnostic test of choice (16) in any hemodialysis patient with severe debilitating back pain, particularly if long-term catheters are used as access. Myelography, although invasive, can be used if MRI is unavailable.

In summary, we have noted a clustering of epidural abscesses in hemodialysis patients in the last 5 yr that correlated with our use of dual-lumen (primarily cuffed) catheters for hemodialysis access. It seems likely that the epidural abscesses were related to previous episodes of catheter-related bacteremia in most, if not all patients. Cases of culture negative abscesses were most likely the results of ongoing antimicrobial therapy. Clinicians need to be cautious in attempts to salvage catheters after episodes of catheter-related bacteremia and be aware of the devastating complications that may result.

REFERENCES