Acute Epidural Abscess of the Cervical Spine Caused By Staphylococcus Aureus: Report Of Two Cases

Staphylococcus Aureus Etkenli Akut Servikal Epidural Abse: İki Olgu Sunumu

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Abstract: This report describes two cases of spinal epidural abscess. At presentation, both patients complained of cervical pain and weakness in the arms and legs. Their neurological examinations revealed quadriplegia and tetraparesis, respectively. In both cases, the definitive diagnosis was established preoperatively with magnetic resonance imaging. Surgical treatment in both patients involved laminectomy through a posterior approach for abscess drainage. In both cases, the causative microorganism was Staphylococcus aureus. The patients received an 8-week course of intravenous vancomycin treatment, and both were followed postoperatively with monthly magnetic resonance imaging scans. Their neurological examinations were normal at 6 months postsurgery.

Key words: Spinal epidural abscess, infection, incidence, magnetic resonance imaging, therapy

Özet: Bu çalışma, spinal epidural abseli iki olguyu içermektedir. Başvuru anında, iki olguda boyun ağrısı ile kol ve bacaklarında kuvvetsizlikten şikayetçiydi. Nörolojik muayeneleri sırasıyla, quadripleji ve tetrapareziyi gösterdi. Her iki olguda da ameliyat öncesi kesin tanı, manyetik rezonans görüntüleme yardımıyla yapıldı. Her iki hastanın da cerrahi tedavisinde, abse drenajı için posterior yaklaşımla laminektomi uygulandı. İki olguda da etken mikroorganizma Staphylococcus aureus'du. Hastalar 8-hafta süreyle intravenöz vancomycin tedavisi aldı, ve ameliyat sonrası aylık olarak manyetik rezonans görüntüleme incelemeleriyle takip edildiler. Cerrahi tedaviden 6 ay sonra yapılan nörolojik muayeneleri normaldi.

Anahtar kelimeler: Enfeksiyon, insidens, manyetik rezonans görüntüleme, spinal epidural abse, tedavi

INTRODUCTION

Spinal epidural abscess (SEA) is very rare, occurring at a reported frequency of 0.2-1.96 per 10,000 hospital admissions (2,9,10,16,17,19,20,22). Despite the progress in imaging, surgical techniques, and antimicrobial therapy, this lesion is still associated with high morbidity and mortality. The mortality rates reported in recent series range from 18% to 31% (2,10,12,13). On the positive side, however, the advances in diagnostic tools, surgery and therapy have led to better prognosis for SEA patients.

Studies have shown that SEA is associated with a number of predisposing factors and conditions, including diabetes mellitus, intravenous drug use, steroid injection for sciatica, paraspinal abscess, cellulitis, malignancy, endocarditis, pneumonia, discography procedure, trauma, duodenolumbar fistula, chronic steroid use, and human

immunodeficiency virus (HIV), and the lesion may also arise as a surgical complication (3,4,8,10,11,13, 15,16,20,22,24).

In this report, we describe two cases of cervical epidural abscess associated with paraspinal abscess. In both instances, the causal organism was Staphylococcus aureus, and both patients presented with acute tetraparesis. The important points highlighted by these cases are as follows: (1) Upper cervical epidural abscess is very rare, and treatment of affected patients who present with acute tetraparesis or quadriplegia is always complicated, even in individuals with lower cervical abscess; (2) Magnetic resonance imaging (MRI) is the best tool for diagnosing SEA; (3) treatment should involve immediate surgical decompression and abscess drainage, combined with appropriate antibiotic therapy. We successfully treated both our patients with early and uncomplicated surgical abscess drainage, in addition to antimicrobial therapy.

CASE REPORTS

CASE 1.

A 72-year-old male presented with the complaints of neck pain and weakness in all four limbs that had started 20 days earlier. His medical history was unremarkable. On physical examination, the patient exhibited respiratory distress and urinary dysfunction. On admission, a neurological examination revealed quadriplegia with no deep tendon reflexes but positive Babinski reflex bilaterally. Laboratory tests revealed leukocytosis (13,000/mm3) and elevated erythrocyte sedimentation rate (ESR) (110 mm/hr). The patient also had an intermittent fever, averaging 38.5°C. The patient was tested positive for anti-HIV antibodies. A posteroanterior lung x-ray demonstrated bilateral pneumonic infiltration. Cervical x-rays showed basilar impression, atlantooccipital fusion and spondylosis. Cervical computerized tomography (CT) demonstrated a lesion compressing the anterior aspect of the cervical spinal cord at C1-C3. MRI revealed a hypointense parapharyngeal mass and a hypointense lesion at C1-C3 (Figure 1).

The preoperative diagnosis was acute epidural abscess of the upper cervical spine. Emergency surgery was planned. The procedure involved a right C2-C3 hemipartial laminectomy through a posterior cervical approach, and was done with the patient in prone position. Upon exposing the site of interest, we found a purulent collection extending from C1 to C3 along the anterior margin of the spinal epidural space. The purulent material was not enclosed in a capsule, but

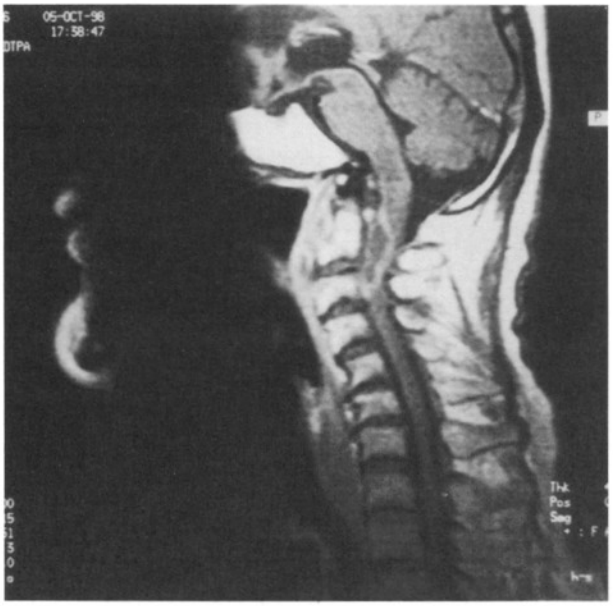

Figure 1: A T1-weighted sagittal MR image captured after intravenous gadolinium injection shows an epidural abscess located adjacent to the anterior aspect of the spinal cord and extending from C1 to C3. Note the marked compression of the anterior spinal cord at this site, as well as the presence of a prevertebral abscess.

appeared to have accumulated freely in the epidural space. There was no dural tear, nor any evidence of cerebrospinal fluid leakage.

We took a swab of the material and culture isolated S. aureus. Starting immediately postoperatively, we administered an 8-week course of intravenous vancomycin at a rate of 2 g/day (4 x 500 mg infusions daily). The patient's quadriplegia began to resolve soon after the surgery. On completing the full course of antimicrobial therapy, his ESR was 28 mm/hr. Cervical MRI at 2 months postsurgery revealed that the lesion site was gradually returning to normal (Figure 2A,2B). The patient was discharged after 60 days of hospitalization with persistent quadriparesis (right side 3/5; left side 2/5), but he was free of cervical pain. Three months after discharge, the muscle power in all his limbs was graded 4/5. At 6 months postsurgery, his neurological examination was normal.

CASE 2:

A 60-year-old woman presented with the complaints of neck pain and left brachialgia of 15 days duration. She also had an upper respiratory tract infection. Her medical history included 5 years of spinal and lower extremity pain, which was managed well with antiinflammatory and analgesic agents. A

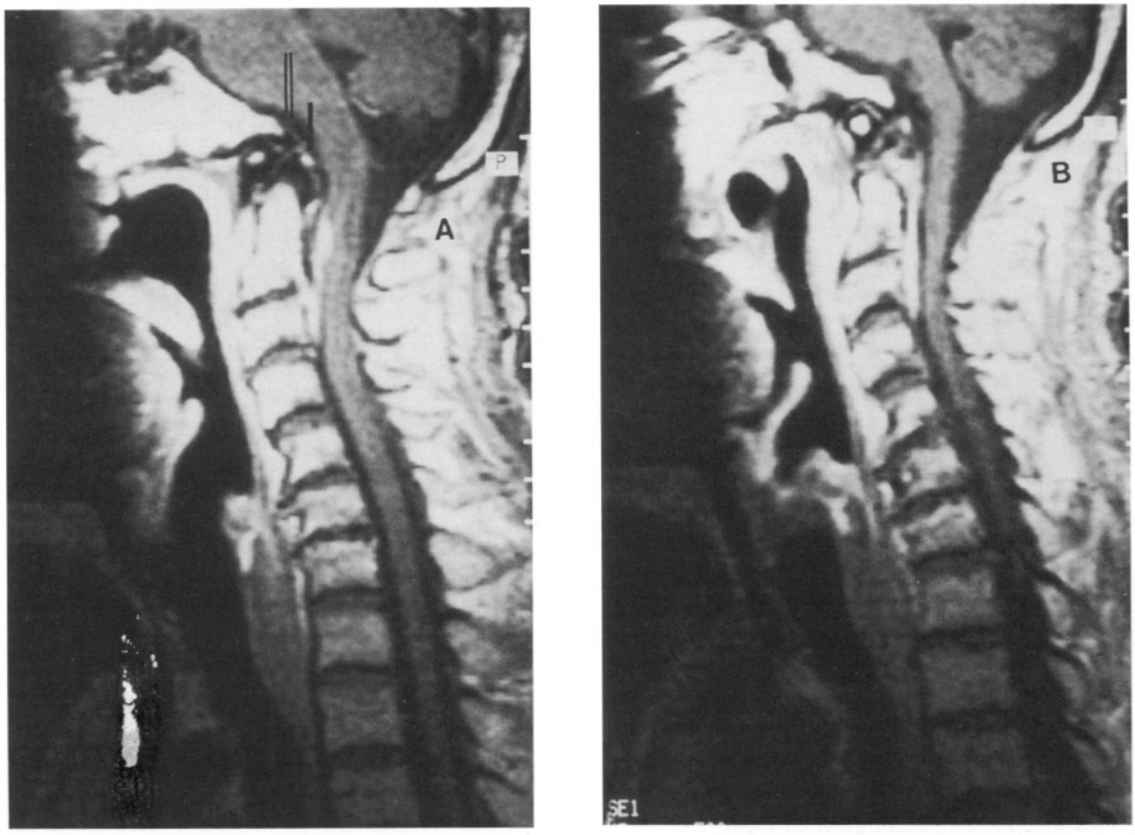

Figure 2: A and B. Gadolinium-enhanced T1-weighted sagittal MR images of the lesion in Figure 1 at 2 months after the operation show that the patient's SEA had significantly decreased in size.

neurological examination revealed weakness of both arms (grade 3/5 muscle power) and both legs (grade 0/5 muscle power). Laboratory findings showed leukocytosis (17,000/mm3) and elevated ESR (170 mm/hr). The patient also had an intermittent fever, averaging 39.0°C. Plain radiographs and cervical CT showed spondylosis in the cervical spine. When the patient deteriorated significantly within hours of our initial assessment, we ordered immediate spinal MRI. Gadolinium-enhanced images revealed an SEA associated with a prevertebral abscess at C6-C7 (Figure 3A,3B).

We carried out emergency surgery through a posterior approach. After performing a left C6-C7 hemipartial laminectomy, we evacuated 10 ml of purulent material from the epidural space. The patient's postoperative course was uneventful. Culture of the material identified S. aureus. We administered intravenous vancomycin at a dose of 2 g/day (4 x 500 mg infusions daily) for 8 weeks. After the antimicrobial therapy, the patient's ESR was 22 mm/hr. As follow-up to the antibiotic treatment, she was referred for inpatient rehabilitation. Three months after the operation, MRI showed that the pathologic findings were resolving (Figure 4A,4B). Over the next 6 months, the patient made a full recovery from her initial complete paraplegia.

DISCUSSION

Various organisms are known to cause SEA (6,7,12). The most common of these are streptococcus species and S. aureus, which was isolated from both our cases (7,16,20,22,23,24,25). Many factors are known to influence outcome in patients who develop this lesion, including the severity of acute or chronic clinical signs and symptoms, the location and extent of the abscess, the degree of spinal cord compression, patient age and medical condition, the surgical or medical treatment applied, and surgical findings of pus versus granulation tissue. Of these, the most important elements are clinical presentation and the surgical and medical therapy that is administered.

Clinical signs and symptoms of SEA can appear within days or weeks of the formation of an abscess focus in the epidural space. Some SEA patients deteriorate rapidly, within a matter of hours or days,

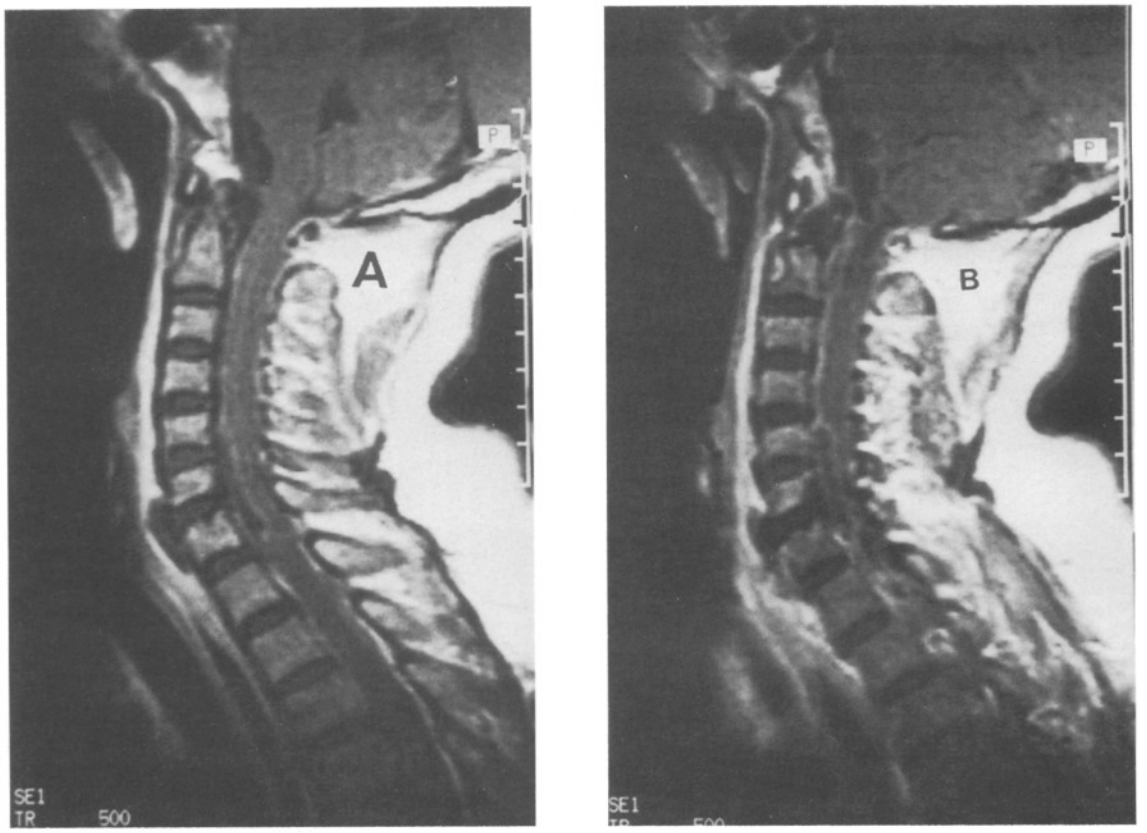

Figure 3: A and B. Contrast-enhanced T1-weighted sagittal MR images demonstrate an epidural abscess at C6-7.

as our cases demonstrated. The typical presenting problems are pain localized near the site of infection and intermittent fever. Involvement of adjacent nerve roots may produce radicular pain. When an abscess compresses the spinal cord or causes cauda equina, the patient exhibits sensory and motor deficits distal to the affected site, as well as impaired sphincter control. Our patients exhibited most of these problems. The compression effect of the abscess may impact one or more vertebral segments.

It is extremely unusual to find a spinal abscess in the upper cervical region (10,13,25). Interestingly, there have been rare findings of infection extending the entire length of the spinal canal from the sacral to the upper cervical levels (25). Curling and colleagues (5) described only one patient with upper cervical epidural abscess in a total of 29 cases of SEA. It is significant to note that both cases we describe in this report presented to our clinic within the past year. The patients had quadriplegia and tetraparesis, respectively, and their SEAs extended from C1 to C3 and from C6 to C7, respectively.

Regarding diagnosis, spinal x-ray films are indicated in the work-up of these cases, but there are usually no abnormal findings unless the patient has a paravertebral abscess or adjacent osteomyelitic lesions. CT and MRI are both valuable tools for evaluating paraspinal and epidural spinal abscesses. CT may reveal intraspinal gas formation (4,14); however, MRI is superior for demonstrating the extent and degree of epidural involvement and the compressive effect on the cord and roots (1,4,16,20,22). MRI is also better than CT for differentiation between SEA and the lesions of transverse myelitis and spinal cord infarction (10). T1-weighted MRI will demonstrate a hypo- or isointense epidural mass. Vertebral osteomyelitic lesions are characterized by reduced signal intensity. T2-weighted MRI shows a high-intensity epidural mass that often enhances with gadolinium injection. MR images of epidural abscess may show a dense and homogeneous or a nonhomogeneous mass, and there may be a thin margin of enhancement at the periphery of the lesion (16,18,20,21,22). We diagnosed both of our SEA cases using MRI.

The treatment indicated for SEA is surgical drainage combined with parenteral antibiotics. In patients with severe and progressive neurological deficits, emergency drainage of the abscess should be

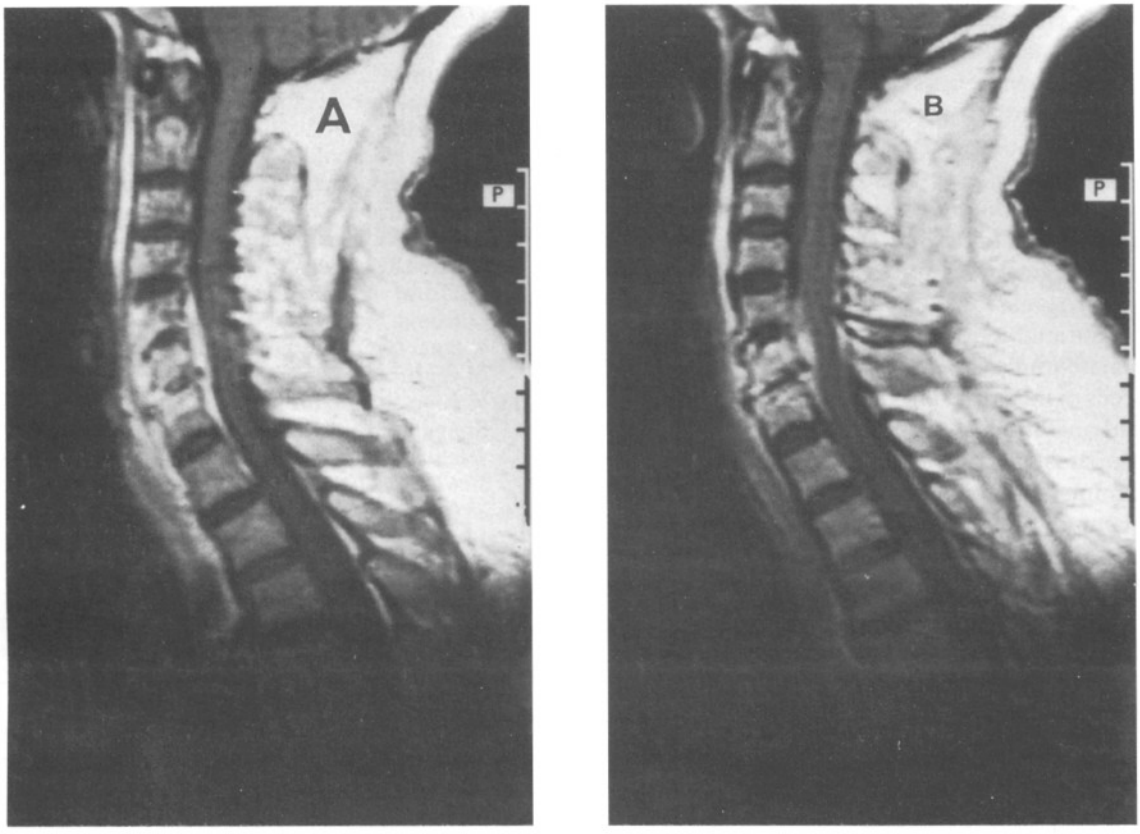

Figure 4: A and B. Contrast- enhanced T1-weighted MR images of the lesion in Figure 3 at 3 months after the operation show that the patient's SEA had decreased in size.

performed via the most convenient and appropriate route. This procedure confirms the diagnosis and simultaneously treats the problem, but care must be taken to prevent spinal instability. Our patients exhibited acute and severe neurological deterioration within 24 hours of presentation, and developed severe quadriplegia and tetraparesis, respectively. Both of the patients had been referred to our department from another clinic, and we immediately performed surgical drainage and initiated effective antibiotic therapy.

In both cases, neurological status began to improve in the early postoperative stages. We prescribed an extended course of antibiotic therapy after surgery for penetration of the deep tissues and clear the infected site. Six months after their operations, both patients had normal neurologic examinations. Parenteral antibiotics should be administered as soon as the diagnosis of spinal abscess is established. The intravenous route for antibiotic therapy should be used for two months(5,10).

Medical treatment alone is indicated for selected patients who have no neurological deficits or who are in very poor health. In these individuals, the high risk of morbidity and mortality associated with surgery and anesthesia may outweigh the benefits of surgical treatment. Obviously, a correct microbiological diagnosis is essential in these cases, and this can usually be achieved through blood culture or from a closed percutaneous biopsy of a paravertebral abscess (17,20,22,25). However, it is important that a neurological team closely monitors high-risk individuals who are treated conservatively because 19% to 23% of these patients will exhibit neurological deterioration despite appropriate antibiotic treatment (10,13,20,22). Tacconi et al. (25) administered conservative treatment to 2 high-risk individuals in a group of 10 patients with SEA. One of the two was a very elderly ambulant patient whose neurological deficits were stabilized. The other was a young patient with few neurological signs for whom conservative treatment was prescribed to circumvent extensive laminectomy.

In conclusion, patients in whom SEA is suspected require careful clinical evaluation, with detailed history-taking and thorough physical and neurologic examinations. When this type of lesion is suspected

preoperatively, antibiotics should be started before surgery, as was done in our cases. Individuals with severe neurologic deficits rarely improve, even when surgical intervention takes place within 6-12 hrs of the onset of paralysis; however, a few series have indicated that there is potential for some recovery when a patient is treated within 36 hrs of paralysis (5,9). This risk of permanent deficit underlines the need for earlier rather than later surgical decompression, whether or not the disease progression is acute. It is essential that appropriate antibiotic therapy should be continued for 8 weeks after surgery in order to fully eradicate the deep focus of infection. The patients in this report were operated on within 24 hrs of the onset of quadriplegia and tetraparesis and postoperative antibiotic treatment was administered for 8 weeks. Both showed gradual improvement over a 6-month period.

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Thoracic spinal cord is the most commonly involved area for intramedullary spinal cord abscess.