Unusual Spinal Epidural Abscess without Predisposing Factors Treated Using a Minimally Invasive Technique

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Spinal epidural abscess (SEA) is an uncommon infectious disease that can have disastrous neurologic complications. Previous reports have identified underlying predisposing characteristics. Here, the authors report unusual 2 cases of multi-segment spinal epidural abscess, without predisposing conditions, which were successfully treated using a minimally invasive technique.

Key Words: Spinal epidural abscess, Multi-segment, Minimally invasive surgery

Spinal epidural abscess (SEA) is an uncommon infectious disease that is often associated with morbidity and mortality. It occurs mainly in adults and rarely in children, and is usually combined with an underlying condition, such as, old age, diabetes mellitus, intravenous drug abuse, chronic kidney disease, systemic immunodeficiency, or iatrogenic procedures. The most common source of infection is hematogenous spread and the primary source of infection can be identified in 50% to 60% of cases. The lumbar level is the most commonly affected site (48%), followed by the thoracic (31%) and cervical levels (21%).

To the best of our knowledge, only three reported cases have involved extension to the whole spine, and all three of these cases had underlying conditions, such as, old age, a repeated epidural injection history, and diabetes mellitus. We report two unusual cases of spinal epidural abscess without causative predisposing conditions, Both cases involved the whole spine, and responded to minimally invasive treatment. The two patients and their families were informed that their case data would be submitted for publication.

CASE REPORTS

Case 1

A 66-year-old woman presented at our emergency room with a high fever (38.7°C) and back pain. She was unable to lie on her back due
to a tingling sensation in both lower extremities. Her medical history revealed that he had undergone hysterectomy due to uterine myoma several years previously, but she had no other medical problem, such as, diabetes mellitus or chronic kidney disease. Laboratory studies demonstrated elevation in white blood cell count (25,300/μl, seg. 78%), erythrocyte sedimentation rate (ESR, 85mm/hr normal value 0–20 mm/hr), and C-reactive protein level (CRP, 135 mg/L normal value 0–0.8 mg/dl). A magnetic resonance imaging study of the whole spine was performed, and revealed an epidural abscess in the C–T–L spines with combined meningitis (Fig. 1).

Empirical antibiotic therapy with intravenous cefazolin was started and subsequently she reported feeling better. However, posterior neck pain and a tingling sensation in both upper extremities developed and progressive weakness of both lower extremities prevented her standing. On the 4th admission day, methicillin-resistant Staphylococcus aureus was identified in a blood culture, and thus, antibiotic therapy was switched from cephalosporin to vancomycin. After continuous antibiotic treatment, her fever subsided and her laboratory data improved (WBC count, 19,560/μl (seg. 68%), ESR 80 mm/hr, and CRP 67 mg/L).

However, here neurological symptoms did not improve. Motor strengths of the lower extremities were iliopsoas 3/3, quadriceps femoris 3/3, tibialis anterior 4/4, and extensor hallucis 4/4, and Deep tendon reflex (DTR) on both legs was increased. Under general anesthesia, unilateral laminectomy was performed at T7 and L5. Pus was dispelled from the laminectomy site, and a silicon catheter was then inserted into the epidural space. We were able to decompress the abscess by cautious manual suction drainage and saline irrigation on both proximal and distal sides. The silicon catheter used was a Two-Lumen Central Venous Catheterization set (ARROW®), which is usually used for subclavian catheterization (Fig. 2).

**Fig. 1.** Pre-operative magnetic resonance images of case 1. An epidural abscess was found to extend from the cervical to the lumbar spine (A, gadolinium-enhanced T1-weighted sagittal scan) and lead to spinal cord compression (B, T2-weighted axial scan).
After the operation, her back pain subsided, and on the 3rd day after surgery, she was able to ambulate.

Intravenous vancomycin was administered for an additional 6 weeks. Her neurologic status and muscle power normalized, as did her WBC count, 4230/μl (seg. 46%), ESR 42 mm/hr, and CRP 8.2 mg/L. Postoperative MRI (Fig. 3) showed complete removal of abscess materials. No SEA recurrence was encountered over a 2-year follow-up period.

Case 2
A 12-year-old boy presented at our emergency room with a fever of up to 38.5°C, abdominal discomfort, and minimal back pain. Laboratory studies demonstrated an elevated WBC count, 13,800/μl (seg. 93.4%), ESR 81 mm/hr, and CRP 123 mg/L. Specific evaluations were done under suspicions of: gastroenteritis, acute pyelonephritis, or an urethral stone, but nothing remarkable was found. On the second admission day, he showed hypesthesia and increased DTR of both lower legs, and a magnetic resonance imaging
study of the whole spine performed immediately confirmed the presence of a dorsal SEA from T1 to T10. The 3rd generation cephalosporin was injected after blood culture. However, clinical symptoms did not improve and no organism was cultured from blood samples. Three days after admission, his lower limb strength decreased to; iliopsoas 4/3, quadriceps femoris 3/3, tibialis anterior 4/4, and extensor hallucis 5/4, and surgical decompression was needed. At 4th days post-admission under general anesthesia, selective unilateral laminectomy of T5 and T9 was performed using a minimally invasive technique, and afterward epidural pus drainage and irrigation were performed using a silicone catheter was done. After intraoperative cultures yielded S. aureus in 3 days after operation, and vancomycin was administered for 4 weeks.

At 2 weeks after operation the patient experienced complete remission of the fever and of the tingling sensation in his lower extremities. A laboratory study showed: WBC count, 12,000/μl (seg, 71%), ESR 31 mm/hr, and CRP 1.06 mg/L. The SEA did not recur during 18 months of follow-up.

DISCUSSION

SEA is a rare entity and represents a severe infection in the epidural space that is capable of causing permanent neurologic damage or death. Ptaszynski et al3) described incident cases of spontaneous epidural abscess among residents of Olmsted County from 1999 to 2000. They calculated an incidence of 0.88 cases per 100,000 person-years, and found that risk factors, such as, concomitant infection, diabetes mellitus, immunosuppression, and intravenous substance abuse, were present in all patients. In addition, a meta-analysis of 915 patients with an epidural abscess identified diabetes mellitus as the single most common risk factor.7) SEA can be caused by osteomyelitis or discitis, and thus, most of the pus is anterior to the spine, whereas in our two cases it was posterior to the spine, probably because our cases were due to bacteremia rather than osteomyelitis or discitis. However, our two cases had no underlying risk factor. Nevertheless, in the absence of specific risk factors of immunosuppression, systemic bacteremia appears to have occurred in both cases. The 12-year-old boy had no neurological symptoms initially: his chief complaints were of abdominal pain accompanied by minimal back pain. Accordingly, when first examined in ER, doctors suspected gastrointestinal or urinary tract problems. In such a situation, missed diagnosis and inadequate treatment can lead to permanent injury. Untreated SEA often results in rapid, irreversible neurologic deterioration, for example, a spinal ache can progress to root pain within 3 days and radicular weakness within 4 to 5 days, and at its worst can progress to paralysis within 24 hours.8) Thus, we recommend that when encountered with uncommon clinical conditions without any risk factors a high level of suspicion should be maintained.

Immediate surgical decompression is usually recommended for SEA, except when surgery is contraindicated.4) We decided on surgical decompression for therapeutic purposes and to harvest the causative organism to identify proper antibiotics. A variety of different techniques have reported, from open decompression and late closure,1) to a limited invasive technique using a Fogarty balloon catheter in combination with limited laminectomies,4) percutaneous computed tomography (CT)–guided needle aspiration,5) and use of a small diameter silicone catheter at two laminectomy sites.9) SEAs can extend into adjacent spinal segments (i.e., cervical, thoracic, or lumbar) although this relatively uncommon. In such situa-
tions, multilevel laminectomies may lead to complications related to prolonged surgery, instability, and late kyphotic deformity. In our two cases, abscess drainage and irrigation were successfully performed using a two-lumen silicone catheter using a minimally invasive technique, which reduced the risks of intraoperative and postoperative morbidities associated with a prolonged operation time. Furthermore, this technique enabled us to avoid the risk of accidental dural penetration, which can occur during CT-guided needle aspiration. In addition, the use of a two-lumen catheter allowed drainage and irrigation to be performed simultaneously.

However, the technique used has some limitations. First, we have treated SEAs, in which purulent granulomatous material adhered so strongly to the dura (probably due to a longer disease duration) that 2-way catheter suction/ fluid irrigation would not have been effective at removing the offending pathology. Second, we were not able to ensure effective removal during surgery. Nevertheless, we did obtain adequate samples for culture, which allowed us to determine an appropriate antibiotic therapy.

CONCLUSION

Spinal epidural abscess can develop extensive spinal involvement in the absence of predisposing conditions, and thus, we advise a high level of suspicion. Furthermore, the described minimally invasive technique involving selective laminectomy and silicon catheter drainage enabled successful treatment without complications or recurrence.

REFERENCES

척추 경막외 농양은 심각한 신경학적 합병증을 유발할 수 있는 흔하지 않은 감염 질환이며 기존의 보고는 대개 기저질환을 동반한 증례이었다. 저자들은 원인 기저질환 없이 발생한 다분절 척추 경막외 농양 2예를 미세 침습적 방법으로 성공적으로 치료하여 이를 보고하고자 한다.
색인 단어: 척추 경막외 농양, 다 분절, 미세 침습 수술