Case report

Holocord spinal epidural abscess: Case report and literature review

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1. Introduction

Holocord spinal epidural abscess (SEA) is a rare condition that can lead to major permanent neurological deficits and significant mortality [1]. To our knowledge, five cases [1–5] of SEA have been reported so far. This neurological disease may appear after a spinal surgery and occurs in patients with diabetes [6], alcoholic dependence, intravenous drug abuse, and immunosuppression [7]. Diagnosis may be delayed and overlooked because of the nonspecific symptoms, such as fever and back pain; however, modern imaging technique may facilitate earlier diagnosis [8]. No consensus has been made on the treatment of holocord SEA yet, but the advent of antibiotic treatment and the recognition of surgical debridement have been important in searching for alternatives to recovery [7]. We report a case of holocord SEA that was treated surgically together with systemic antibiotics at our hospital.

2. Case report

A 65-year-old female with diabetes presented a two-week history of progressively worsening pain in her low back and legs.

Upon examination, she experienced severe tenderness in the lumbar process, muscle strength of 4/5 in her both upper limbs, 4/5 in her left lower limb, and 3/5 in her right lower limb. No sensory disturbances were observed except for the diminished peroneal sensation. Reflexes were reduced in the upper extremities and in the quadriceps, with normal ankle jerk reflexes. Positive pathologic reflexes were evident in the lower limbs, whereas negative pathologic reflexes were observed in the upper limbs. Leg movement during physical evaluation exacerbated the pain.

The patient was afebrile with a white blood cell count at 11.09 × 10⁹/L, neutrophil count at 8.65 × 10⁹/L, erythrocyte sedimentation rate at 86 mm/hr, and C-reactive protein density at 78 mg/L. Fasting blood glucose level was at 252 mg/dL, and albumin density at 26.95 g/L. Results were negative on the presence of antibodies to human immunodeficiency virus, blood, and urine cultures.

Results from the spinal magnetic resonance imaging (MRI) demonstrated an extensive fluid collection from the C-1 posterior arch to the sacrum that was compressing the spinal cord. The MRI result for the lumbar spine also showed a regional dorsal paraspinal collection (Fig. 1).

Empirical intravenous treatment with vancomycin (1.5 g/d) [4] was given to the patient for one week before admission, along with an adequate glucose control (insulin pump), antibiotic (1.5 g/d vancomycin for one week), and albumin infusion (50 ml/qd), which were achieved before surgery [9].

The patient underwent drainage and irrigation of the abscess (L3–L5). Here, the laminae of L3–L5 were exposed, and a thick yellow fluid was immediately observed in the paraspinal muscles. The ligamentum flavum was incised, and an epidural abscess was found to be adherent to the dura. The abscess was evacuated with the assistance of suction. Two epidural catheters were introduced.
Fig. 1. Spinal MR showed obvious extensive abscess located anterior and posterior to the (a) cervical, (b) thoracic, and (c) lumbar spinal cord preoperatively, and an axial T1-weighted MR image of the lumbar spine demonstrated a large epidural fluid collection in the paraspinal muscles (marked by white arrows).
into the enlarged epidural space and the paraspinal pus cavity; these catheters were used to flush the abscess with saline. Another two soft silicon catheters (20 F) were used to drain the epidural space and the paraspinal muscles. Irrigation (saline; 3 L/day) from the catheters enabled the abscess to evacuate (Fig. 2). A surgical culture from this abscess confirmed methicillin-resistant Staphylococcus aureus (MRSA) [8,10].

The patient received intravenous treatment, but vancomycin (2 g/d) intake was stopped after 10 days because of hearing loss. Instead, the patient took linezolid (1.2 g/d) for three weeks. The postoperative erythrocyte sedimentation rate decreased to 23 mm/hr, and the CRP reading was 9.28 mg/L. White blood cell count from the routine blood testing was $8.86 \times 10^9$/L, and the neutrophil count was $4.65 \times 10^9$/L. The catheters were pulled out after two weeks according to the drainage fluid cell counting. A follow-up MRI of the spine after three months revealed a near-complete resolution of the epidural abscess (Fig. 3).

The patient remained neurologically stable and continued to be clinically in good condition without any low back pain after one year.

3. Discussion

SEA is a rare but severe infectious condition, and its involvement from the cervical to the lumbar region (holocord SEA) is exceedingly uncommon.

Back pain, fever, and neurological deficits are the most common symptoms of SEA [10]. However, these symptoms present in only a minority of patients which make diagnosis difficult [4]. In this case, the patient suffered from low back pain and severe neurological impairment without fever.

The MRI of this patient showed obvious extensive abscesses located anterior to the cervical and thoracic cord, and changes in the lumbar vertebral bodies, epidural space, and dorsal paraspinal muscle without obvious vertebral osteomyelitis [11,12].

A confirmed microbiologic diagnosis is essential, which can be achieved by blood culture or any culturing material from the biopsy of the abscess. In this case, holocord SEA was caused by MRSA indicating poorer presentation and outcomes, although S. aureus is present up to 70% of all cases [13] as the most common causative organism. Vancomycin (2 g/d) and linezolid (1.2 g/d) were used for a few weeks pre- and postoperatively according to surgical culture.

Lam et al. [14] found that the standard treatment for extensive SEA is surgical debridement with or without operative stabilization, followed by prolonged antibiotic therapy, but O’Brien et al. treated a 71-year-old patient using non-operative management and found that medical management alone could apply to those unfit for surgery and those with extensive epidural abscesses, abscess located anterior to the cord, absence of neurologic impairment, and prolonged (24–72 h) paralysis [5]. In our case, non-operative treatment alone is not recommended for widespread application, so the patient received intravenous treatment before surgery because of the high glucose level, low albumin density and bad condition, which may deteriorate even threaten her life after emergency surgery.

Widespread decompression and debridement potentially predispose patients to complications, such as instability and postoperative low back pain, increased blood loss and recovery time, cardiac and respiratory difficulties, and late kyphotic deformity [7]. These symptoms are attributed to the use of surgical multilevel decompression in extensive SEA.

A 36-year-old man with extensive SEA from the C2 to the sacrum was treated with limited laminectomy in the cervical (C3–C5), thoracic (T5–T6), and lumbar spine (L4–L5) instead of a long decompression [15]. Irrigation was used to remove the pus from each laminectomy level, and a complete drainage of the epidural space was attained. As reported in the recent literature, irrigation is always used with one kind of catheter, such as Fogarty embolectomy catheter, silicon catheter, and pediatric urinary catheter [15–17].

The patient in our case underwent laminectomy (L3–L5) in the most serious levels as revealed by MRI. We used two epidural catheters to flush the abscess with saline. Another two soft silicon catheters (20 F) were used to drain the epidural space and paraspinal muscles. Irrigation (saline; 3 L/day) by these catheters enabled us to evacuate the abscess. Saline was washed into the epidural and paraspinal space through the epidural catheters and drained from the silicon catheter, and bacterial spread may not happen because of sufficient debridement, continuing saline irrigation, and better condition of the patient during intravenous treatment.

Follow-up MRI of the spine after one month revealed few residual abscesses within the spinal canal, and several paravertebral abscesses were cured by the irrigation system composed of the epidural and silicon catheters in our hospital.

Fig. 2. Intraoperative photographs (white arrows: the outlet silicon catheters; black arrows: the inlet epidural catheters).
4. Conclusion

Holocord SEA is a rare disease, and delayed diagnosis and treatment can be fatal. Surgical drainage, together with systemic antibiotics, is the main treatment choice for extensive SEAs [13]. Although treatment should be considered that highlights the importance of examining the factors related to the health and condition of the patients and the anatomy and extent of the abscess,
early surgical treatment associated with prolonged antibiotic treatment is necessary.

Disclosure of interest

The authors declare that they have no competing interest.

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References