



Case Report

Pediatric spinal infection with epidural abscess: A report of two cases

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ABSTRACT

Background: Pediatric spinal infections are rare and often accompanied by abscesses. Delayed diagnosis commonly leads to a poor neurological prognosis, emphasizing the need for early diagnosis and treatment.

Case Description: We report on two cases of spinal infection; one in a 5-year-old boy with a T8-11 epidural abscess and one in a 10-year-old boy with an L5-S1 epidural abscess. Both cases improved with conservative therapy.

Conclusion: Early magnetic resonance imaging diagnosis and systemic treatment in collaboration with pediatricians are key factors in the successful management of children with spinal infections.

Keywords: Epidural abscess, Magnetic resonance imaging, Pediatrics

INTRODUCTION

Spinal infections including epidural abscesses are rare in children and thus not often encountered in routine clinical practice.^[4,9] Early diagnosis and identification of the route of infection are necessary for appropriate management without resultant neurological sequelae. Late diagnosis and therefore delayed treatment often occurs due to delays in hospital visits, poor history taking, and difficulty in obtaining magnetic resonance imaging (MRI) examinations. We report on two cases of the successful treatment of pediatric spinal epidural abscesses due to early diagnosis good collaboration with pediatricians.

CASE PRESENTATION

Case 1

A 5-year-old boy attended another hospital complaining of a 1-month history of worsening back pain and fever. After 1 month, his symptoms had not improved and he attended our facility.

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On physical and neurological examination, he had a normal level of consciousness, a body temperature of 38.6°C, and no neurological deficits. Blood tests revealed a white blood cell (WBC) count of 12,900/ μ L, hemoglobin 11.7 g/dL, platelet 30.1×10^4 / μ L, and C-reactive protein (CRP) 10.83 mg/dL. T2-weighted images of contrast-enhanced MRI revealed a mild hyperintense space-occupying lesion with a ring-shaped contrast effect located epidurally on the dorsal side of the T8-11 level [Figure 1a] and an epidural abscess was diagnosed. Pharyngeal bacterial tests revealed *Streptococcus aureus*, and a sinusoidal abscess with tonsillitis was noted on sinus computed tomography [Figure 1b]. In consultation with a pediatrician, administration of ampicillin (ABPC) 200 mg/kg/day and cefotaxime (CTX) 270 mg/kg/day was commenced. One day after the start of antibiotics, the patient's fever and pain were relieved. On day 14, the CRP became negative, and MRI T2-weighted imaging showed an almost complete disappearance of the epidural abscess, although the high-intensity region remained. Nineteen days later, the patient experienced a drug eruption and antibiotics were stopped. He was discharged after 3 weeks. MRI at 1.5 months and 5 months posttreatment showed no recurrence with no neurological symptoms [Figure 1c].

Case 2

A 10-year-old boy presented to a regional hospital with back pain. His backache continued for 3 weeks, and after developing a fever, he visited another hospital. Blood tests showed high inflammatory markers and the patient was referred to our hospital. On physical examination, his level of consciousness was normal and he had a temperature of 37.7°C. He had no neurological deficits and no paresthesia. Blood tests revealed a WBC of 14,200/ μ L and CRP was 1.8 mg/dL. MRI revealed a multilocular epidural mass contiguous with the L5/S1 intervertebral disc showing low intensity on T1-weighted image and high intensity on

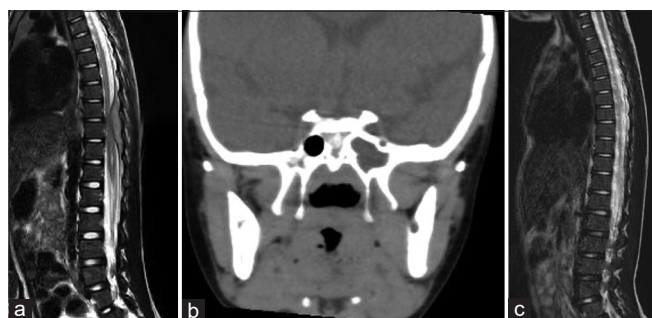


Figure 1: (a) Sagittal T2-weighted magnetic resonance image (MRI) on admission showing mild hyperintensity on the dorsal side of the epidural lining at T8-11. (b) Coronal computed tomography image showing sinusoidal abscess. (c) Sagittal T2-weighted MRI on day 14 showing almost complete resolution of the epidural abscess.

T2-weighted image [Figure 2a and b]. Methicillin-susceptible *S. aureus* (MSSA) was detected in the blood culture taken at admission.

Purulent spondylitis and an epidural abscess were diagnosed at L5/S1. Cefazolin (CEZ) administration was started based on antibiotic sensitivity tests. A whole-body examination revealed a tyloma on the sole of the foot [Figure 2c], which was suspected to be the source of the infection. Inflammatory findings gradually improved after commencement of antibiotics. Fever settled with CEZ administration for 2 weeks, but a weakly positive CRP persisted. As the patient had suppurative discitis, antibiotics were continued even after the CRP became negative at 6 weeks and were administered for 8 weeks in total. He was transferred to a pediatric rehabilitation center and a hip spica cast was applied for lumbosacral immobilization for 6 weeks. No recurrence was seen until 9 months after the initial onset, the last observation point [Figure 2d and e].

DISCUSSION

Spinal infections are generally caused by hematogenous spread of bacteria to the spine and the tissues around it or from the direct spread of purulent lesions.^[2] Clinical manifestations include local pain, fever, and neurological symptoms. Local pain is a frequently observed symptom, and severe pain often suggests an epidural abscess.^[22] With purulent spondylitis, fever is absent in about 50% of cases.^[2] Progression may cause palsy, sensory deficits, and bladder and/or rectal disorders. The frequency of purulent spondylitis in patients under 20 years old is reported to be 0.3 per 100,000 a year and epidural abscesses are even rarer, with only 31 reported cases in the English literature.^[6,9]

MRI is reported to be an extremely effective diagnostic tool^[3,13,19] and diffusion-weighted imaging in particular has been reported to be useful in both the diagnosis and differential diagnosis,^[16] although in practice, it is not often used. The reasons for this are that (a) fever is a common childhood symptom, (b) initial examinations are often done by community doctors without access to MRI, and (c) MRI in young patients is often technically difficult and requires sedation. These factors often lead to a delay in diagnosis of spinal infections and therefore orthopedic surgeons need to have a high index of clinical suspicion for spinal infections in children presenting with low back pain and fever. Early diagnosis with MRI and systemic management in collaboration with a pediatrician are key factors in achieving successful outcomes in children with spinal infections.

To study the recent trends in spinal infections, we analyzed 12 cases, including our own, in patients under the age of 15 reported in Japan since 2000

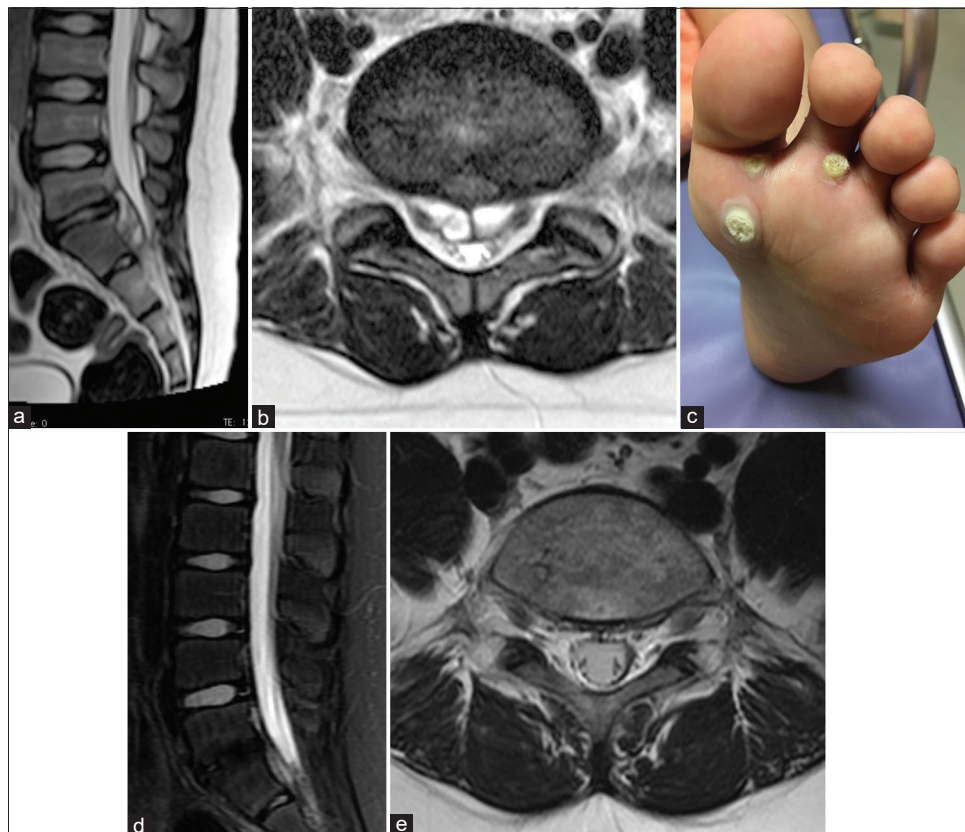


Figure 2: (a) Sagittal T2-weighted MRIs on admission showing L5/S1 high-intensity lesion of the intervertebral disc and abscess in the spinal canal. (b) Axial T2-weighted MRIs on admission showing L5/S1 high-intensity lesion of the intervertebral disc and abscess in the spinal canal. (c) Tyloma on sole of foot, suspected to be the source of infection. (d) Sagittal T2-weighted MRIs showing complete disappearance of the mass and the intensity change of the intervertebral disc. (e) Axial T2-weighted MRIs showing complete disappearance of the mass and the intensity change of the intervertebral disc.

[Table 1].^[1,5,8,10-12,14,15,17,18,20] Findings in previous reports included no gender difference, many older children have this disease, the most common location of the infection is the lumbar spine, and the causative organism is most commonly MSSA, all of which were consistent with our case. Broad-spectrum antibiotics were used in approximately half of the reported cases as the causative bacterium was unknown. CEZ is used most commonly due to the fact that MSSA is the most frequently found causative organism; however, it is important to attempt to identify the route of infection and to select appropriate antibiotics based on culture results. In our cases, the infection route was determined by a full body examination and culture tests were performed in collaboration with a pediatrician. In both cases, the suspected mechanism of infection was hematogenous spread. In addition, in case 1, ABPC and CTX were selected due to the detection of *S. aureus* in the sphenoid sinus abscess, and in case 2, CEZ was selected based on the blood culture results. In case 1, the sphenoid sinus abscess was considered to be the source of the spinal infection as many cases of intracranial epidural abscesses

secondary to sphenoid sinus abscesses have been reported and the results of systemic screening examination did not indicate any other infected foci.

Imaging studies have been shown to be a poor indicator for disease regression and therefore treatment completion,^[21] however, if the lesions extend to the vertebral bodies or intervertebral discs, administration of antibiotics for 6–8 weeks is recommended. Even when only an epidural abscess is found, it is considered necessary to eliminate the lesion. In case 1, as no spinal lesion was present and the patient experienced a drug eruption, antibiotics were terminated after confirming the disappearance of the epidural abscess. In CASE 2, the lesions extended into the intervertebral disc and the vertebral body, so antibiotic therapy was continued for 8 weeks. In general, neurologic deficits, sepsis, an intraspinal empyema, the failure of conservative treatment, and spinal instability are all indications for surgical treatment.^[7] In both of our cases, no surgical intervention was performed, but it should be considered if necessary.

Table 1: Reported cases of spinal infections in patients under 15 years old in Japan (since 2000) including our two cases.

Authors (year)	Age (years)/sex	Symptoms	Diagnosis period	Affected site	Abscess	Causative bacteria	Diagnostic method	Treatment
Sato et al. (2015) ^[18]	11F	Fever Lumbago	20 days	L3/4	-	-	MRI, CT	Abx
Sato et al. (2015) ^[18]	15M	Fever Lumbago	8 days	Sacroiliac joint	Iliopsoas	MSSA	MRI	Abx (CTRX+CEZ)
Hoshino et al. (2011) ^[8]	8F	Fever Lumbago	19 days	L5/S1	Epidural	-	MRI	Abx (CAZ+CLDM)
Hoshino et al. (2011) ^[8]	14M	Fever Lumbago	50 days	Th11/12	Paraspinal	-	MRI	Abx (CTRX)
Matsumoto et al. (2000) ^[15]	15F	Lumbago	3 months	L3/4	Iliopsoas	Salmonella	MRI, CT, needle biopsy	Abx (AZT)
Kawasaki et al. (2000) ^[12]	13F	Fever Lumbago	3 weeks	L5	Epidural	-	MRI	Abx
Wake et al. (2003) ^[20]	15M	Fever Lumbago	3 days	L2/3	-	MSSA	MRI	Abx (CEZ), drainage
Kunishige et al. (2004) ^[14]	14M	Fever Lumbago	10 days	L4	Epidural	MSSA	MRI	Abx (SBT/ABPC)
Doi et al. (2006) ^[5]	12F	Fever Lumbago	2 days	L5/S1	Epidural	Salmonella	MRI	Abx (PIPC)
Ishigami et al. (2007) ^[11]	13F	Lumbago	3 months	Th12/L1	Paraspinal	Salmonella	MRI, CT, needle biopsy	Abx (ABPC)
Aihara et al. (2007) ^[1]	1M	Fever	1 month	Th8	Paraspinal	MRSA	MRI, CT	Abx (VCM+AMK)
Iida et al. (2008) ^[10]	15M	Fever Lumbago	2 months	L3/4	-	MSSA	MRI, CT	Abx
Morozumi and Ideguchi (2009) ^[17]	9M	Fever Lumbago	2 months	L4/5	Paraspinal	-	MRI	Abx (MEPM)
Case 1	5M	Fever Backache	1 month	Th8-11	Epidural	<i>Streptococcus aureus</i>	MRI, CT	Abx (ABPC+CTX)
Case 2	10M	Fever Lumbago	20 days	L5/S1	Epidural	MSSA	MRI, CT	Abx (CEZ)

MRI: Magnetic resonance imaging, CT: Computed tomography, Abx: Antibiotics, MSSA: Methicillin-susceptible *Staphylococcus aureus*, CTRX: Ceftriaxone, CEZ: Cefazolin, CAZ: Ceftazidime, CLDM: Clindamycin, AZT: Aztreonam, SBT/ABPC: Sulbactam/ampicillin, PIPC: Piperacillin, MRSA: Methicillin-resistant *Staphylococcus aureus*, VCM: Vancomycin, AMK: Amikacin, MEPM: Meropenem, CTX: Cefotaxime

CONCLUSION

A spinal infection should always be considered when examining a child with fever and back pain. Definitive diagnosis through MRI as well as collaboration with pediatricians, full body examination to determine the infection route, and appropriate antibiotic choice are all essential for successful treatment.

Ethical approval

Informed consent was obtained from patients and/or guardians before data use, and patient confidentiality was assured.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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