

Pyogenic Intradural Abscess of Lumbar Spine: A Case Report

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We report a case of spinal intradural abscess which shows serial changes on magnetic resonance imaging (MRI). Well-encapsulated, rim-enhancing lesion with mass effect was visualized at ventral side of lumbar spinal canal on 17 days after initial negative MRI, which was thought to be epidural abscess. It was revealed to be intradural in location on operation and successfully treated by drainage and antibiotics. Follow-up MRI showed resolution of abscess. Clinical significance and pathogenesis of this case was briefly discussed. (Korean J Neurotrauma 2015;11(1):18-21)

KEY WORDS: Intradural abscess · Lumbar spine · Magnetic resonance imaging · Drainage.

Introduction

Spinal intradural abscess are very rare. We present a case of spinal intradural abscess showing sequential magnetic resonance imaging (MRI) findings. There are a few reports on MR findings of spinal intradural abscesses, one case of serial changes on round encapsulated mass at filum terminale, the other on cervical lesion mimicking epidural lesion.^{7,10,11,15,16} No case of sequential MRI findings in clinical setting of subacute spinal abscess has been described previously. The radiological course and pathogenesis of this lesion was discussed briefly.

Case Report

A 70-year-old female patient presented to the emergency room with progressive paraparesis and back pain. She underwent excision of skin lesion located at lower sacrum two days

earlier. The exact details of the surgical procedures, which were performed at an outside hospital, were not available. Fever and lower back pain developed after operation. Her body temperature was 39°C. There was tenderness at lower lumbar area. Neurological examination revealed lower extremity weakness of grade IV, sensory deficit at L5, S1 dermatome. The patient was human immunodeficiency virus negative. No drug abuse history was obtained.

White blood cell count (9270/mm³) was normal, C-reactive protein (32.95, normal range 0.00 to 0.49 mg/dL) and erythrocyte sedimentation rate (63, normal range 0 to 20 mm/hr) were elevated. MRI of the lumbar spine on admission showed no definite abnormal mass lesion. There was irregular enhancement along the epidural space at L4–5 and L5–S1 without mass effect. It was thought to be enhancement of epidural venous plexus, suggestive of spondylitis (Figure 1). She was managed with intravenous ceftriaxone and vancomycin. Her fever subsided after antibiotics therapy. Methicillin sensitive *Staphylococcus aureus* was identified at blood culture taken at initial evaluation. Vancomycin was changed to nafcillin according to culture report. There was no microorganism identified on follow-up blood culture. On 16th hospital day, she complained of aggravated lower extremity pain. Neurological examinations showed no change of mild lower extremity weakness and mild sensory deficit. There were no meningeal irritation signs. Follow-up MRI was performed on the next day. Elongated shape, rim-

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FIGURE 1. Initial magnetic resonance imaging of the lumbar spine. Precontrast T1-weighted images (A, C) and postcontrast T1-weighted images (B, D) depict irregular, linear enhancement in the epidural venous plexus at L4–5 and L5–S1 level (black arrows in B, white arrow in D). There was no abscess formation.

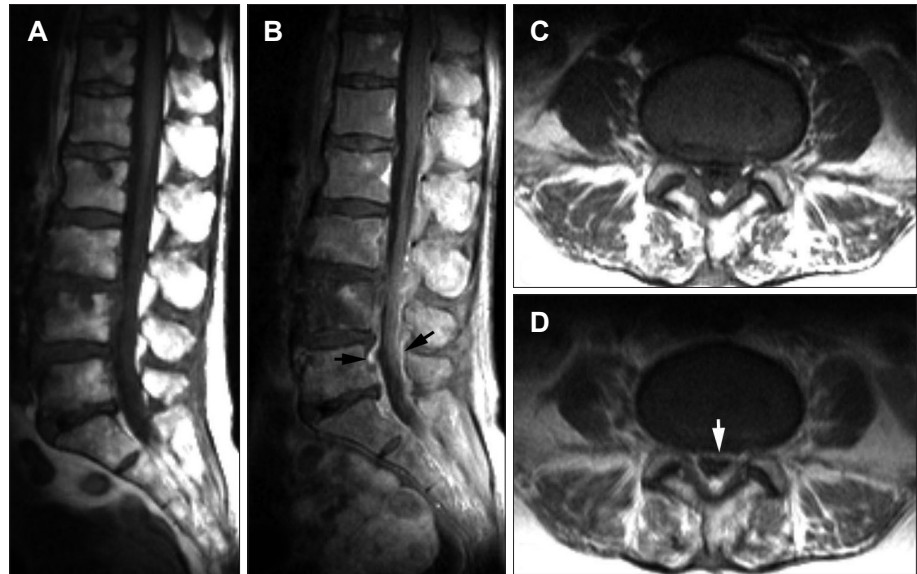
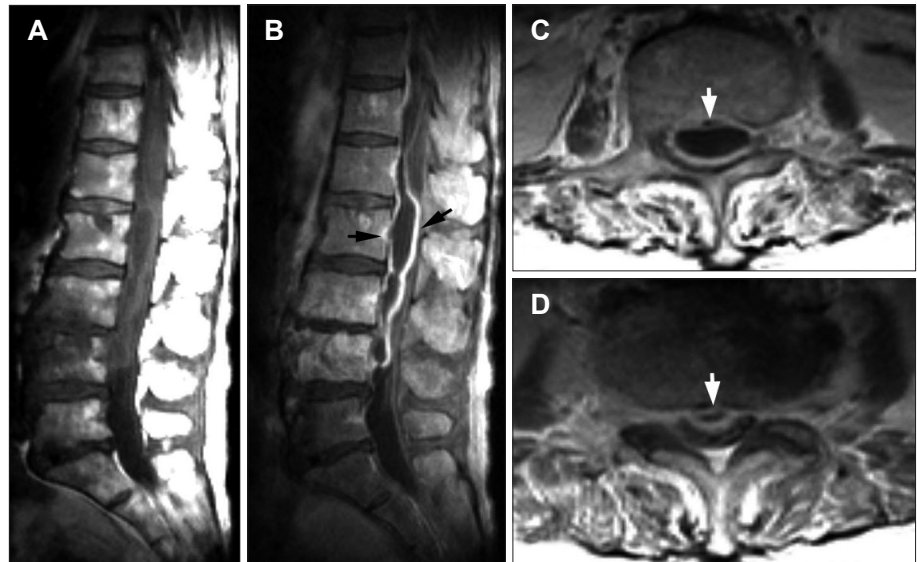


FIGURE 2. Preoperative follow-up magnetic resonance imaging obtained on 17th day of intravenous antibiotic treatment. Precontrast T1-weighted images (A) and postcontrast T1-weighted images (B-D) show elongated shape fluid collection with rim-enhancement at ventral side of spinal canal (arrows) at L2–4 level. On axial images at L2 (C) and L3–4 level (D) the abscess shows dorsally convex and mass effect on the dural sac mimicking epidural lesion (arrows).



enhancing cystic lesion were noted at ventral side of the spinal canal, L2–4 level causing displacement and severe compression of the dural sac. On axial image obtained L2 level, rim-enhancing cystic lesion showed broad-base attachment to the vertebral body and dorsal convexity with compression of the dural sac (Figure 2). It was thought to be epidural abscess.

An emergency L2 laminectomy was performed. The epidural space appeared to be free of inflammation, pus, or granulation tissue. A vertical durotomy was performed at exposed area. There found scanty cerebrospinal fluid with normal clarity, cauda equina without inflammatory change. A thin-walled abscess cavity was found at ventral side of the intradural space. Pus gushed out on incision of the yellow-colored wall. There was no discernable white fibrous

layer at abscess capsule (Figure 3). The cavity was irrigated with antibiotics mixed saline and the wall was removed partially. On postanesthetic recovery, her pain on lower extremities was markedly subsided. Pus culture revealed no growth of microorganism. She was managed with the same intravenous antibiotics for 3 weeks postoperatively. Then oral cephalexin was administered for 4 following weeks. Follow-up MRI obtained 2 weeks after operation showed markedly decreased abscess size (Figure 4). The patient was transferred to rehabilitation medicine 3 weeks after operation. She was discharged after 2 months of hospitalization. She was ambulatory and complained no leg pain.

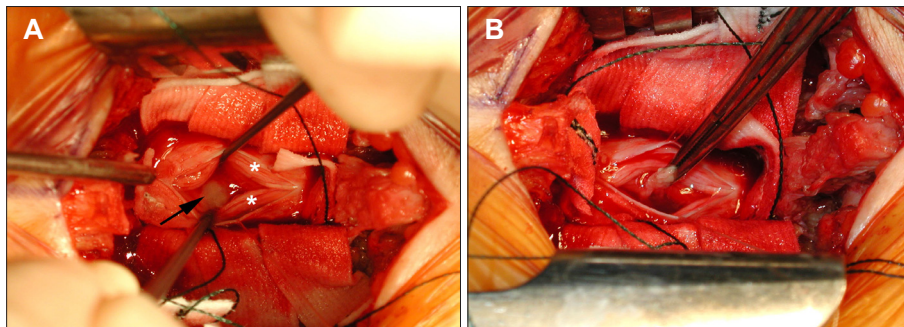


FIGURE 3. Intraoperative photographs. A: Yellowish purulent material was oozing out (black arrow) between lumbar nerve roots (white asterisks) after opening of cyst wall. B: A part of cyst wall was grasped by forceps.

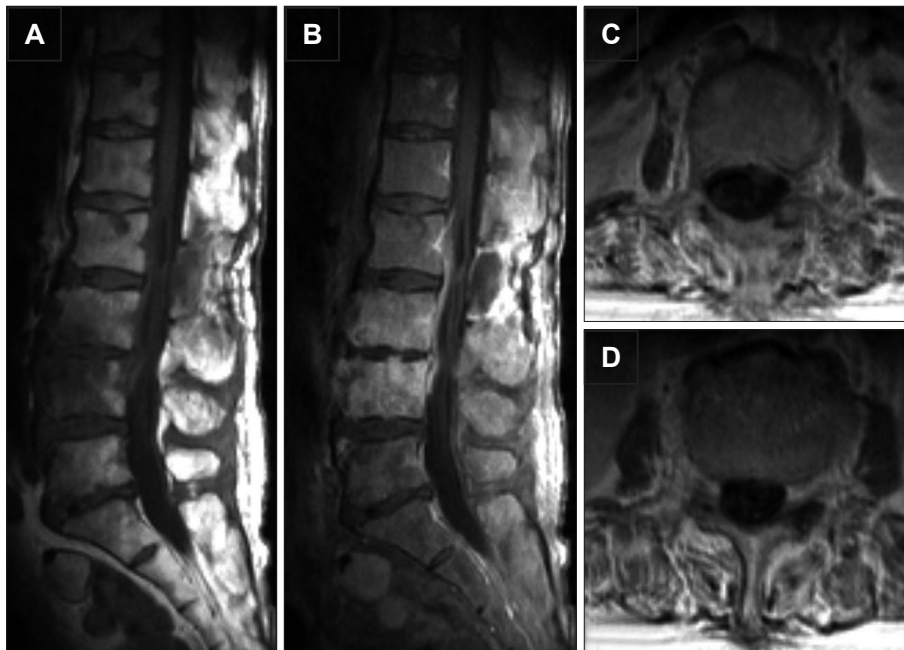


FIGURE 4. Follow-up magnetic resonance imaging (MRI) obtained 2 weeks after operation. Precontrast T1-weighted images (A) and postcontrast T1-weighted images (B-D) show near complete disappearance of intraspinal rim-enhancing lesion observed on preoperative MRI as described in Figure 2.

Discussion

Intradural extramedullary abscesses are extremely uncommon than epidural lesions, only several tens of cases have been reported.^{1,2,4-8,11-13} Lumbar was most common site of involvement, more frequent in older ages (6th decades or later). *Staphylococcus aureus* was the most common pathogen. It usually was caused by hematogenous spread from spread from a distant focus. It was also known that considerable numbers of cases are iatrogenic, developed after lumbar puncture, injection of local anesthetic agents, and discography.² In general, they are located diffusely in the subdural space, not forming a discrete mass lesion.^{2,9,15} Clinical signs of meningitis and infectious changes of the cerebrospinal fluid are usually present because of subdural distribution.³

Our case has several unique features compared to previously reported cases. Firstly, it has thick, well-developed capsule with strong enhancement mimicking that of epidural abscess. This finding, probably caused by systemic antibiot-

ics used for treatment of bacteremia, is very unusual in reported cases of subdural abscess.^{10,11,15,16}

Another feature is well-visualized chronological changes on MRI with clinical change. Our case shows that well-encapsulated abscess can be formed and be cause of root compression symptom in about 3 weeks after bacterial inoculation. No case of sequential MRI findings in clinical setting of subacute spinal abscess has been described previously, although there is one case of chronic course.¹⁶ With respect spinal epidural abscess, there was one report describing radiological changes on serial MRI in accordance with clinical improvement.¹⁴

Our case also shows that formation and progression of abscess is possible despite appropriate antibiotics coverage. Therefore, follow-up imaging study is to be done in clinical deterioration even if there was no definite abscess on initial imaging. Progression of infection by another resistant organism seems unlikely because the lesion was regressed after drainage with the same antibiotics.

The pathogenesis of our case would be speculated as follows: after the operation of skin lesion, subsequent bacteremia was incurred. The presence of bacteremia was supported by positive result of blood culture and systemic symptoms such as fever. At this time the bacteria settled in lumbar epidural venous plexus caused lumbar discospondylitis without abscess formation as shown on initial MRI. It seems that the bacteria settled also in the intradural space at the same time. Although we can not confirm the exact time of bacterial inoculation in the intradural space, later bacterial settle down seems less plausible due to systemic antibiotics administration and negative result of follow-up blood culture. This speculation that intradural abscess was formed from intradural inoculum of bacteria can be supported by difference in the level of epidural infection shown at initial MRI and abscess shown at MRI taken 2 weeks later (Figures 1 and 2). Antibiotics eradicated bacteria in systemic circulation and infection of epidural venous plexus. However, the lower concentration of antibiotics in intradural space compared to systemic circulation helped the progression of inflammation. By the action of systemic antibiotics and host defense mechanism, the infection was limited by thick capsule although not completely cured. This finding, probably caused by systemic antibiotics used for treatment of bacteremia, is very unusual in reported cases of intradural abscess.^{10,11,15,16)}

Although rare, the presence of infection of subdural space should be suspected for appropriate management because of difficulty in correct preoperative discrimination of subdural from epidural abscess.^{2,11)} Although clinical course is usually fulminant, spinal subdural abscess can be successfully treated by prompt drainage of purulent material and appropriate antibiotics administration as in this case.⁹⁾

Conclusion

This is very unique case showing the whole radiological course of intradural spinal abscess and difficulty in correct preoperative diagnosis. It clearly depicted serial changes of intradural abscess on MRI, from progression to remission. Although very rare, clinicians are to pay attention to the possi-

bility of intradural location.

■ The authors have no financial conflicts of interest.

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