

Original Article

Acute adult cervical pyogenic discitis with neurological deterioration treated by antibiotics

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Abstract: Acute adult primary cervical pyogenic spondylodiscitis and discitis are usually treated with surgery and antibiotics, particularly for cases demonstrating neurological deficit. Here we report a case of acute adult primary cervical pyogenic discitis with the formation of epidural abscess treated with antibiotics alone. A 36-year-old male presented with neck and bilateral upper limb pain for 6 days. Physical examination showed evident nuchal rigidity and tenderness in the neck, and slight bilateral upper limb weakness. Laboratory findings revealed elevated white blood cell count, erythrocyte sedimentation rate and C-reactive protein level. Magnetic resonance imaging revealed epidural abscess extending from C4 to C6, resulting in anterior compression of the spinal cord. Blood culture detected *Staphylococcus aureus*. Although the disease had progressed and upper limb weakness was aggravated, only antibiotics without surgery were administered. The patient's pain eased and body temperature, WBC count, ESR, and CRP normalized after antibiotics were administered intravenously. He was discharged after 3 weeks of antibiotic therapy. A follow-up MRI showed that the abscess had been absorbed completely, and no recurrence of discitis was found. In conclusion, cervical pyogenic discitis is a rare spinal infection and antibiotics can be effective in treating this disease, even if compression caused by epidural abscess leads to a neurological deficit.

Keywords: Spinal infection, cervical discitis, epidural abscess

Introduction

Diagnosing a spinal infection tends to be delayed due to the rarity of this disease and lack of knowledge, which can lead to a poor clinical outcome. Spinal infection is rare, accounting for only 1-7% of all skeletal infections, which have an incidence of 1:250,000-1:400,000 people [1-5]. However, the incidence of spinal infection is increasing due to such factors as the aging population, the increased incidence of immunosuppressive conditions, the increased use of invasive procedures, and intravenous drug abuse. *Staphylococcus aureus* is the main causative organism, accounting for 53-78% of all spinal infections [6-9].

Acute adult primary cervical pyogenic spondylodiscitis and discitis are usually treated with surgery and antibiotics, particularly for cases demonstrating neurological deficit. Discitis is a rare type of spinal infection. Up to now, there are few reports on the treatment of pyogenic discitis with epidural abscess by using antibiotics

alone. Here we describe a case of acute adult primary cervical pyogenic discitis with epidural abscess treated with antibiotics alone without surgery.

Case report

A 36-year-old male was referred to our hospital after suffering neck and bilateral upper limb pain for 6 days. Neck, chest, and bilateral upper limb pain had developed without cause. Neck movement was restrained, and moderate fever followed 2 days later. The patient's condition had been diagnosed as cervical disc herniation at a local hospital. However, non-steroidal anti-inflammatory drug and other therapies had no effects. Physical examination revealed a temperature of 37.5°C, evident nuchal rigidity and neck tenderness, slight bilateral upper limb weakness (grade 4/5 based on the Medical Research Council scale for muscle strength), no sensory deficit or hyper-reflexia in either upper limb, and a positive Hoffman's sign. No weakness, sensory deficit, or hyper-reflexia was

Cervical pyogenic discitis treated by antibiotics

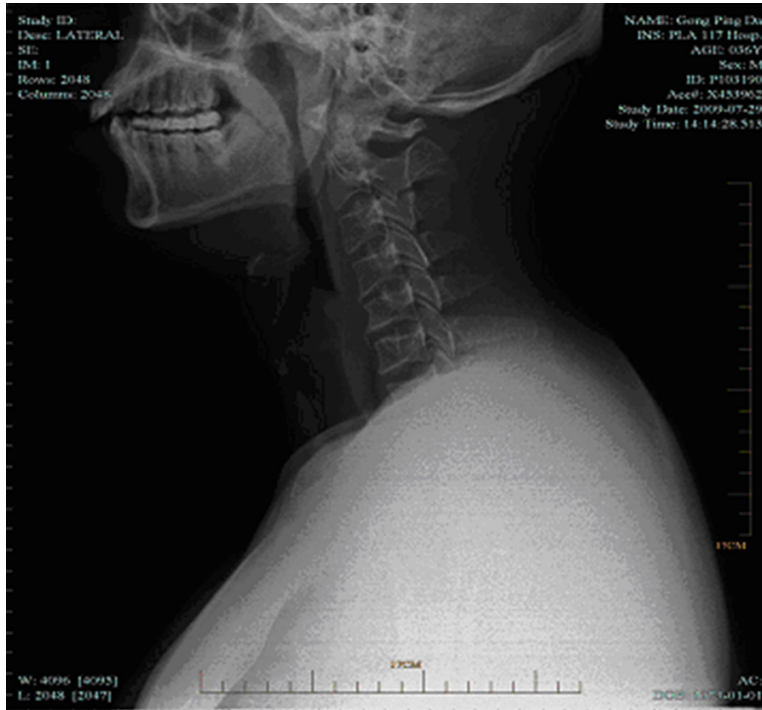


Figure 1. A lateral plain radiograph of cervical spine on admission.



Figure 2. Magnetic resonance imaging (MRI) of the patient on admission. The sagittal T2 images showed C4/5 discitis and epidural formation.

as follows: elevated white blood cell (WBC) count ($7.34 \times 10^9/L$); elevated erythrocyte sedimentation rate (ESR) (65 mm/h) and elevated C-reactive protein (CRP) level (102 mg/L). X-ray showed the degeneration of the cervical spine (Figure 1). Magnetic resonance imaging (MRI) revealed an epidural abscess that extended from C4 to C6, resulting in anterior compression of the spinal cord and mild disc herniation at C3-C7 (Figure 2). After admission, the patient developed high fever (39.6°C). At the same time, the neck pain became aggravated, and upper limb weakness worsened (grade 3/5). We administered broad-spectrum antibiotics piperacillin sodium and sulbactam sodium, as well as an analgesic, and fitted the patient with a neck collar. Enhanced MRI revealed an enlarged epidural abscess and aggravated anterior compression of the spinal cord (Figure 3). The patient's pain eased, and body temperature normalized after receiving intravenous antibiotics. The patient strongly insisted on receiving conservative therapy only and antibiotic therapy was subsequently continued under close observation, with the understanding that emergency surgery would be required if the disease worsened.

After the identification of *Staphylococcus aureus* in the patient's blood culture, antibiotic regimen was changed to cefoperazone sodium and sulbactam sodium 2 days later. The patient improved in subsequent days with WBC count, ESR, CRP, and body temperature back to normal. His pain diminished, and the bilateral upper limb weakness recovered gradually (grade 4/5). MRI

detected in either lower limb. No sphincter disturbance was found. Laboratory findings were

diminished, and the bilateral upper limb weakness recovered gradually (grade 4/5). MRI

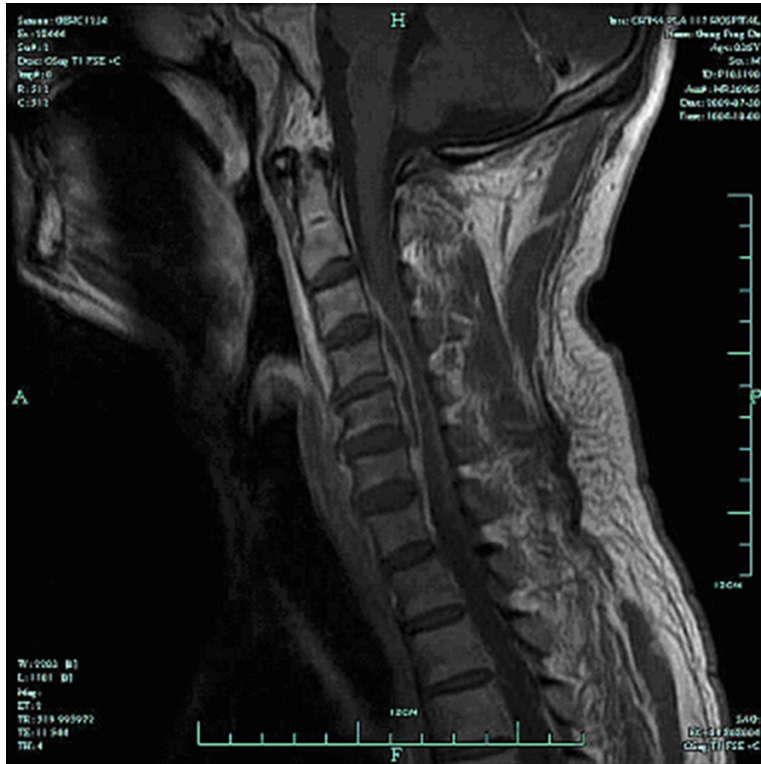


Figure 3. The sagittal enhanced MRI two days after initial MRI. The abscess became larger and extended from C3 to C7.



Figure 4. The sagittal MRI after antibiotics therapy. The epidural abscess was smaller, but the signal of adjacent vertebra (C3) changed which indicated the adjacent vertebra is spread.

showed that the abscess became smaller during treatment (**Figure 4**). The patient was discharged after 3 weeks of antibiotic therapy and visited the outpatient clinic for a follow-up examination 6 months later. He was satisfied with his status, although he continued to experience occasional neck discomfort, which had been a long-term recurring issue before developing spondylodiscitis. He had no upper limb weakness. MRI showed narrowing of the C4-5 intervertebral space, but the abscess had been absorbed completely, and no sign of recurring spondylodiscitis was detected (**Figure 5**). X-ray demonstrated fusion at the C4-C5 spine level (**Figure 6**). The patient remains under surveillance after 5 years. The most recent MRI revealed that the C3/4, 5/6, 6/7 herniation had progressed mildly (**Figure 7**). Occasional neck discomfort remained his chief complaint.

Discussion

In this case report we present a rare case of primary cervical discitis, which occurred in an uncommon region. Spinal infections include spondylodiscitis, discitis, vertebral osteomyelitis, epidural abscess, and facet joint infection. Spondylodiscitis accounts for most of these cases, whereas the remaining conditions are relatively uncommon. However, only a few cases of spondylodiscitis have been reported [6, 7, 10-12]. A spinal infection can occur in any spinal region but seldom occurs in the cervical spine. In a previous study, cervical involvement was reported in only 30 of 495 cases of spon-

Cervical pyogenic discitis treated by antibiotics



Figure 5. The sagittal MRI half a year later. C4/5 intervertebral space narrowed, the abscess was completely absorbed and no recurrence sign of spondylodiscitis was found.



Figure 6. A lateral plain radiograph of cervical spine three years after discharge. C4/5 was fused.

dylodiscitis [6]. Another study reported that 10 of 101 patients with pyogenic spinal infection

showed cervical involvement [7]. Heyde et al. evaluated 332 patients and reported a similar proportion [13]. Another study examined 102 patients with pyogenic spinal infection, and only 19 cases (18.6%) showed cervical involvement [12].

The mechanism of spondylodiscitis remains unclear and is controversial. Some authors believe that a spinal infection begins in the subchondral bone as an osteomyelitic lesion and then spreads to intervertebral discs [14]. Because the cancellous vertebral bone adjacent to endplates has a rich vascular supply in the adult, it is considered the most common focus for hematogenous spinal infections [15, 16]. Pure discitis is an infection involving only the disc, and usually occurs in children or as a complication of surgery or other invasive procedure [17]. Because the disc space has no vascular supply in the adult, a hematogenous infection of the disc space is unlikely [18]. MRI is important for diagnosing and distinguishing a spinal infection. It was reported that most cases of discitis in children are actually spondylodiscitis [19]. Ghormley et al. [20] stated that intervertebral disc infections and vertebral osteomyelitis are probably different stages of the same disease. Nevertheless, the disc is involved in almost all spinal infection cases, while pure discitis is very rare. Either discitis or vertebral osteomyelitis may eventually develop into spondylodiscitis. This may be another reason why pure discitis and pure vertebral osteomyelitis are uncommon. Here

present such a rare case. Two radiologists and two orthopedists independently examined the

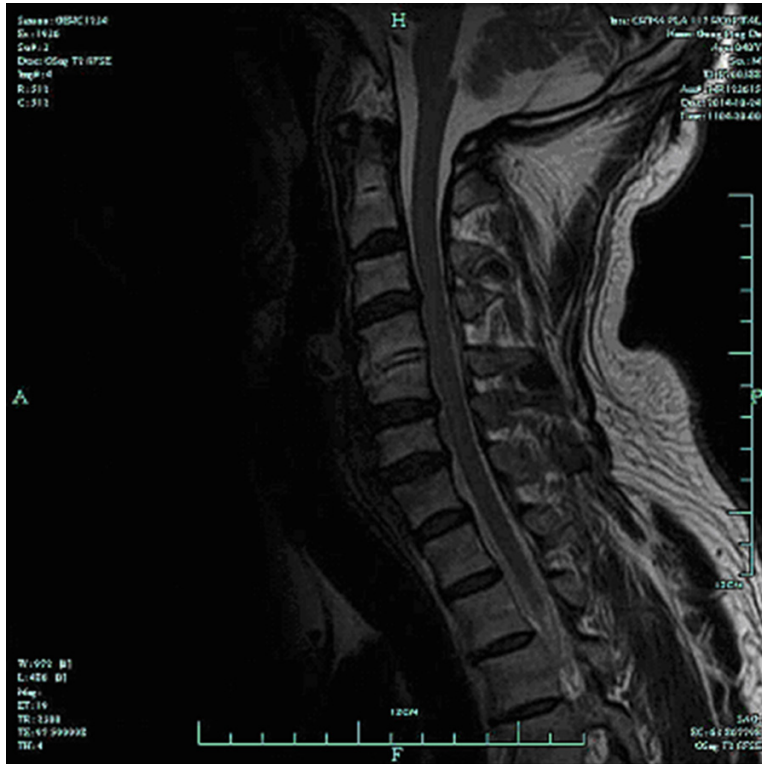


Figure 7. The sagittal MRIs 5 years after discharge. C4/5 was fused and no recurrence sign of spondylodiscitis was detected.

MRI findings of this case, and reported that no osteomyelitis was evident in adjacent vertebrae. Accordingly, this case meets the standard for pure spinal discitis. Two weeks after the initial MRI, a second MRI showed that the signal from the adjacent vertebra had changed, indicating that the adjacent vertebra became involved (**Figure 4**).

In the past, spinal infections were most frequently treated in a conservative manner. A small portion of these patients recovered fully, whereas the majority did not, particularly those who had vertebral fracture, unstable spine, or neurological deficit. In fact, the disease had very high death and disability rates [21-23]. The situation has changed gradually with the development of new drugs, materials, and surgical techniques. Currently, most physicians treat patients with spinal infection with a combination of surgery and antibiotics [6, 7, 12, 23, 24]. The indications for surgery generally include vertebral fracture, unstable spine, spine deformity, epidural abscess, neurological deficit, and failed conservative therapy. The goals and advantages of surgery include

debriding infected tissue, correcting any spinal deformity, re-stabilizing the spine, decompressing the spinal cord, identifying the causative organism, and enabling specific antibiotic therapy. The anterior approach is widely accepted and applied for spondylodiscitis, as abscesses are usually located ventral to the spinal cord. However, a posterior approach may be used under specific conditions [10, 11, 23]. An infection in the cervical region requires surgery much more frequently. Epidural abscess-complicating spondylodiscitis occurs most often in the cervical spine, followed by the thoracic and lumbar areas. The rate of paraplegia or paraparesis is also the highest in patients with disease in the cervical and thoracic regions. An epidural abscess occurs in 57.9-90% of cervical infections

compared to only 20-50% of spinal infections [7, 23, 25-27]. In addition, neurological impairment is found in 40-68.4% of cervical infections compared to 33.6-54.2% of spinal infections [6, 7, 23, 28]. The neck is generally a more dangerous area than the lumbar or thoracic region, suggesting that a more aggressive method is often required [12]. Although surgery and antibiotics are effective for patients with an infected spine, some physicians insist that antibiotics alone can be used to successfully treat some cases of spinal infection. Several studies reported favorable outcomes using antibiotics combined with other conservative methods in these patients [11, 29], and our case supports this view. Our patient suffered neurological deterioration caused by compression from the epidural abscess, which is a strong indication for surgery. However, he was treated conservatively by request. Fortunately, his recovery was complete. Although the treatment course was stressful, the outcome was quite encouraging. Our patient is quite satisfied with his current status, which has made us reconsider the indications for surgery. A patient with epidural abscess and neurological deficit

Cervical pyogenic discitis treated by antibiotics

may not require surgery if the causative organism is susceptible to antibiotics. It has been reported that pure discitis can be successfully cured with conservative therapy [18, 29]. However, if conservative therapy is pursued, neurological deficit may worsen and impact recovery, which would otherwise be avoided by early surgery. This risk must be considered seriously. Identifying the best choice for these patients requires more cases and further studies. Nevertheless, we have provided another approach to treat this disease. Close observation is required when these patients are treated conservatively, and aggressive emergency surgery should be performed in cases of a progressing infection.

Disclosure of conflict of interest

None.

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