

## A report on intraspinal abscess due to community-acquired methicillin-resistant *Staphylococcus aureus* infection

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*To the Editor:* The incidence of community acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infection and reports of CA-MRSA infection have been increasing yearly. But community-acquired intraspinal methicillin-resistant *Staphylococcus aureus* (MRSA) infection has never been reported. We describe a case of intraspinal abscess due to CA-MRSA infection.

A 10-year-old Han Chinese girl developed a fever without obvious cause. The peak temperature at early-onset was about 38.5°C, and fevers were irregular accompanied with chills. Her temperature could be reduced to a normal level with antipyretic treatments. The patient had gone to a footbath shop for manicure services due to paronychia 20 days before. A small amount of white viscous liquid had been drained from both great toes. About 3 days after, the patient developed paroxysmal arthralgia in both knees, low back pain, with peak temperature increasing to 40°C, and was admitted to a local hospital. Blood tests showed her white blood cell (WBC) counts was  $3.41 \times 10^9/L$ , C-reactive protein (CRP) concentration was 37.57 mg/L, and erythrocyte sedimentation rate (ESR) was 26 mm/h. Lumbosacral enhanced magnetic resonance imaging (MRI) showed an abnormal spinal extradural plate-like signal in the L4 and S2 vertebra, which was considered as an inflammation, stenosis of the spinal canal, and a weak signal at L5 and S1 consistent with bone marrow edema. The patient was treated with penicillin for 6 days and vancomycin for 3 days, but the fevers and low back pain persisted.

For further diagnosis and treatment, the patient was transferred to our hospital after 11 days since the fevers. Examination on admission showed a weight of 50 kg, a temperature of 38.2°C, a heart rates of 85 beats per minute, a respiration rates of 18 breaths per minute, a blood pressure of 103/63 mmHg, and L4-S2 lumbar tenderness (+) which was pronounced when leaning to the right side. Laboratory examinations showed WBC count of  $4.30 \times 10^9/L$ , CRP concentration of 55.01 mg/L, procalcitonin

concentration of 0.105 ng/mL, human serum amyloid a protein concentration of 156.6 mg/L, ESR of 80 mm/h. Two sets of blood cultures were negative. *Mycobacterium tuberculosis* IgG antibody and purified protein derivative was positive, T-SPOT, and *Brucellosis* test was negative. Blood biochemical test did not show any abnormalities, and *Treponema pallidum* and HIV antibodies were negative. Spinal MRI at our hospital showed L5 and S1 vertebral infections complicated with vertebral posterior abscess formation, secondary stenosis of the spinal canal at the same levels. The presumptive diagnosis was infectious lesions or tuberculosis.

Therapy was started with cephalosporin 1 g every 8 hours combined with vancomycin 1 g every 12 hours from the 1st day at our hospital. The irregular fevers continued, but the peak temperature was slightly decreased (38.5°C), and the low back pain persisted. The patient was transferred to the spinal orthopedic department of our hospital on hospital day 12 and rechecked MRI [Figure 1]. On hospital day 26, posterior-lateral transforaminal microendoscopic lesion clearance and biopsy under local infiltration anesthesia and venous enhancement was performed. The intraoperative intrathecal abscess bacterial culture was positive for *Staphylococcus aureus*, and no acid-fast bacillus or cryptococcus was observed.

After surgery, the patient was transferred back to the medical department. Drug sensitivity report showed that minimum inhibitory concentration of oxacillin, ampicillin, penicillin, clindamycin are >2, >8, >0.25, and >2 mg/L. According to medical history, pus bacterial culture and drug sensitivity report, definitive diagnosis was CA-MRSA. Based on the drug sensitivity results, the patient was treated with vancomycin 1 g every 12 hours combined with rifampicin 0.45 g every 24 hours when the MIC of vancomycin and rifampicin are  $\leq 1$  and  $\leq 0.5$  mg/L on day 5 after surgery. Recommended dosing of vancomycin for child is 15 to 20 mg/kg every 12 hours with 4.5% to 6.0% vancomycin-related toxicity.<sup>[1]</sup> And tuberculosis-infected

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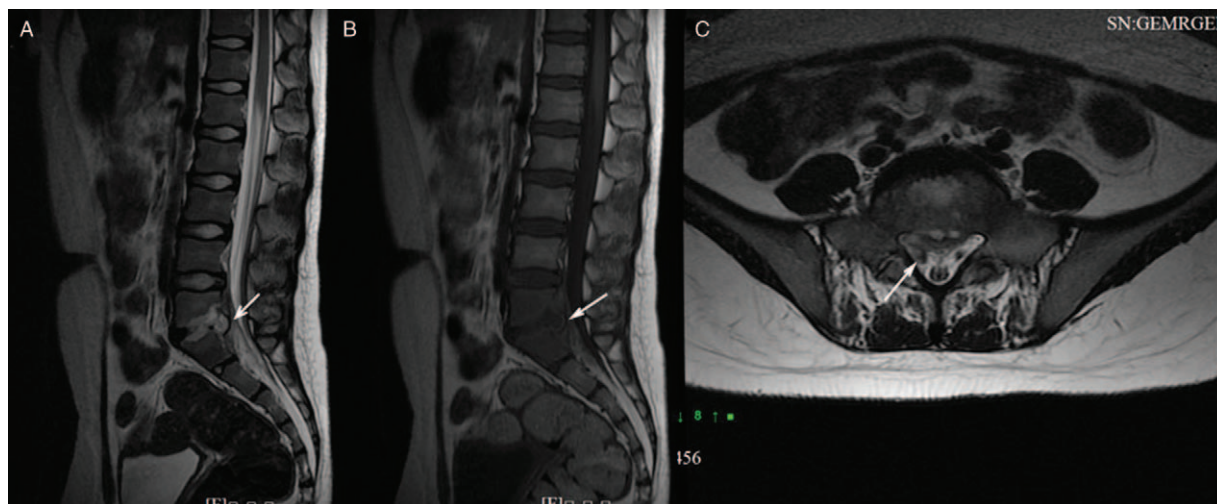
DOI:  
10.1097/CM9.000000000000074

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Chinese Medical Journal 2019;132(3)

Received: 28-11-2018 Edited by: Li-Min Chen

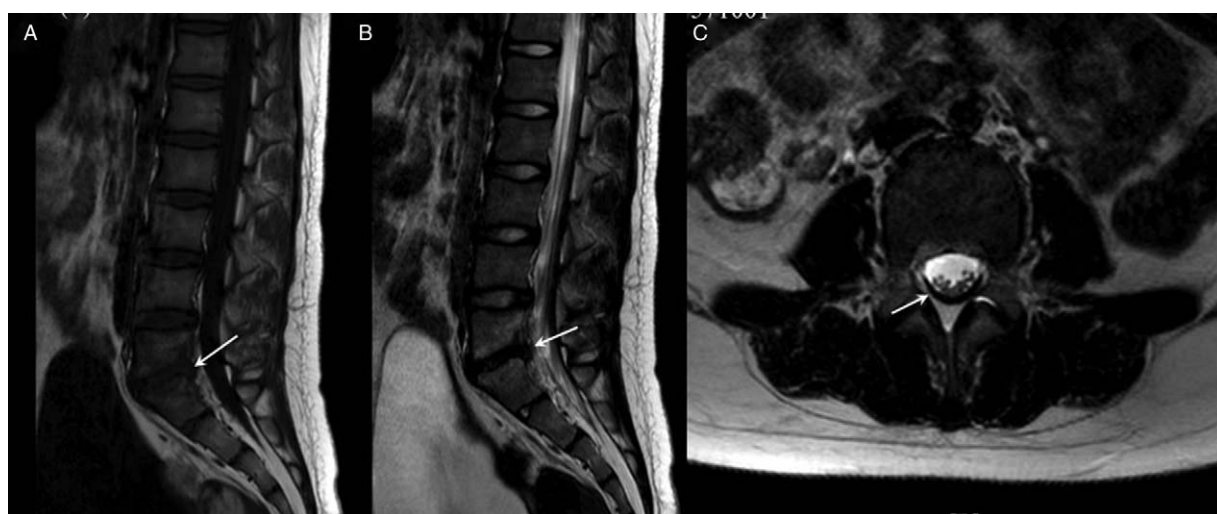


**Figure 1:** (A and B) Magnetic resonance imaging (MRI) in sagittal view showed that the lumbar physiological curve was straight. Abnormal signals with arrows pointing at the vertebrae edge adjacent to L5 and S1, as well as on the intervertebral discs, the L5/S1 intervertebral space was narrowed. A small depression and eroded bone on the L5 and S1 vertebrae edge was noted. (C) Cross-sectional image showed that a curved soft tissue shadow could be observed on the vertebra posterior border, arrow point at the high T2WI signal, and the anteroposterior spinal canal diameter was 0.5 cm.

children treated with 4 months of rifampin have <5% adverse events.<sup>[2]</sup> Therefore, the treatment was safe for the patient. Cephalosporin was discontinued. Regrettably, therapeutic monitoring of serum vancomycin was not performed in the patient during the treatment. Two days after surgery her temperature normalized, and the low back pain was markedly remission. Lumbar MRI on 18 days after surgery showed abnormal signals on the vertebrae edge adjacent to L5 and S1, as well as on the intervertebral disc, but the range was slightly smaller. Rifampicin was stopped on 32 days after surgery because of leukopenia, skin rashes, and itching. The patient left our hospital after the symptoms were completely remission on 32 days after surgery, and continued to receive vancomycin

treatment at the local hospital. The vancomycin was discontinued on 50 days after surgery. MRI at that time showed that the abnormal signals on the vertebrae edge adjacent to L5 and S1 and the intervertebral discs had decreased [Figure 2]. The patient received linezolid 10 mg/kg every 8 hours for 2 weeks from 52 days after surgery.

Intraspinous infections often occur in patients with lumbar spinal surgery history, which might be caused by inappropriate preoperative preparation, surgical complications, blood infections, and improper wound management. The cases without receiving lumbar surgery or lumbar vertebrae fracture surgery but developed symptoms of intraspinal infection were rare.



**Figure 2:** (A and B) The range of the abnormal signals, which arrows point at the vertebrae edge adjacent to L5 and S1, as well as on the intervertebral disc, was smaller. The L5/S1 intervertebral space was narrowed. There was a small area of bone destruction on the L5 and S1 vertebrae edge, but the range was slightly smaller. (C) Partial nucleus pulposus removal had been performed, and the cross-sectional image showed that the curved soft-tissue shadow on the vertebra posterior border was smaller, spinal stenosis could not be observed, and the anteroposterior spinal canal diameter with arrow pointing at was 1.4 cm.

Due to the abuse of antibiotics, the number of drug-resistant strains has increased yearly. MRSA has gradually become a common pathogen. Reports of CA-MRSA have increased, most involve skin, soft tissue and other locations. Reports of facet joint arthritis due to CA-MRSA infection have been reported.<sup>[3,4]</sup> However, intraspinal abscess formation caused by CA-MRSA infection has not been previously reported.

Antibiotic treatment should be adjusted according to drug-sensitivity test results. Before drug-sensitivity results are available, empirical treatment with vancomycin can be considered. When there is intraspinal abscess formation or nerve compression symptoms, incision and debridement should be performed to remove pus and inflammatory granulation tissue, which can speed up control of the infection and avoid further spread of inflammation.<sup>[5]</sup>

The patient in our study underwent surgical debridement to remove the intraspinal abscess, and MRSA was cultured to provide a definitive diagnosis. Vancomycin, rifampicin, and oral linezolid was administered. The MRSA was sensitive to these 3 drugs she received, and the antibiotics could pass through the blood brain barrier. The total treatment course was about 11 weeks, and the girl recovered.

In summary, this study reported a case of intraspinal abscess due to CA-MRSA. The incidence of CA-MRSA has been increasing. Although rare, CA-MRSA should be considered a possible pathogen in intraspinal infection without lumbar spine surgery history, which is helpful to diagnose and treat it in time.

#### **Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

#### **Conflicts of interest**

None.

#### **Author contributions**

Jie Peng was responsible for study conception and design. Jin-Xin Zhang drafted the manuscript, and performed the data analysis. Li-Bo Tang summarized the clinical data.

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**How to cite this article:** Zhang JX, Tang LB, Peng J. A report on intraspinal abscess due to community-acquired methicillin-resistant *Staphylococcus aureus* infection. *Chin Med J* 2019;132:364–366. doi: 10.1097/CM9.0000000000000074