CASE REPORT

Intrathecal spinal abscesses due to *Candida albicans* in an immunocompetent man

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SUMMARY

Infections of the central nervous system due to *Candida albicans* are uncommon and are usually only observed in special circumstances, such as following neurosurgery or penetrating head trauma, in immunosuppressed patients, premature infants or in patients with ventriculoperitoneal shunts. The author reports a case of an immunocompetent man who presented with a thoracic intraspinal abscess due to *C. albicans*. Despite surgical drainage and 6 weeks of high-dose fluconazole therapy, the abscess extended and recurred in the cervical spine, requiring a second operation to arrest the infection.

BACKGROUND

Candida sp are yeasts that are constituents of the normal microbiota of the mouth, gastrointestinal tract and vagina. *Candida albicans*, the most common species involved in human infections, can cause opportunistic oral and genital infections, as well as invasive infections and fungaemias. Candidal infections of the central nervous system (CNS) are rare and are usually observed in the setting of severe immunosuppression, or when anatomic barriers are breached by surgery or implanted devices.

CASE PRESENTATION

A 27-year-old male prisoner was transferred to our hospital from jail due to leg weakness and inability to get up after falling. Eleven months prior to admission to our hospital, he was incarcerated in another county in our state for 6 months. During his time in jail, he was a frequent visitor to the infirmary because of aches and pains in his back and shoulders, and he received treatment with non-steroidal anti-inflammatory drugs (NSAIDs) and probably also oral and intramuscular methylprednisolone. After about 6 months of incarceration, he has given a conditional release under court order to participate in a community-based drug treatment programme for cocaine addiction. While participating in the outpatient drug rehabilitation programme, in May of 2013, he was hit by a car while riding his bicycle. He suffered non-penetrating bruises and soft-tissue injuries to his back in that accident. He was seen at a hospital emergency room, had a normal neurological examination and CT scans of the head, neck and back, and was released to his home and resumed the drug recovery programme. Following the bicycle accident, he had back pain and was treated as an outpatient with NSAIDs and physical therapy, but

despite this his back pain worsened, and he developed weakness of the legs that made it impossible to ascend the stairs at the rehabilitation facility. Because of his leg weakness, he was remanded back to jail for his supposed 'refusal to participate' in the activities of the programme. Two-and-a-half months before admission to our hospital, he was given an intramuscular injection of ketorolac, and another course of oral methylprednisone on a tapering dose over 6 days. He also received transcutaneous electrical nerve stimulation and gabapentin for his pain syndrome. Two months prior to his admission to the hospital, he was transferred to a jail in our city. His leg weakness gradually worsened until he had difficulty even walking on a level surface. He collapsed, was unable to get up and was sent to our hospital emergency room in late September 2013.

He had been addicted to cocaine, but he denied ever using intravenous drugs. He was known to be hepatitis C positive, possibly from tattoos he had received.

On arrival, he had normal vital signs, with a temperature of 36.4°C, blood pressure of 110/70, pulse of 86 and respirations of 14. His general physical examination was normal, including head, eyes, nose, mouth and throat. His chest, lungs and heart were normal to examination, as was the abdomen. Cranial nerve examination was normal, as was his speech, but on motor examination his leg strength was reduced to three of five bilaterally, including flexors and extensors. Patellar reflexes were 3+ bilaterally, and ankle reflexes were 2+, without any ankle clonus. He had normal ability to feel light touch and pinprick in his legs and feet, but he did note unpleasant tingling paraesthesias of his feet and toes. His mental status was alert and oriented.

His white cell count was $7.4 \times 10^9/L$ with a normal differential count. The erythrocyte sedimentation rate (ESR) was normal at 3 mm/hour, and the C reactive protein was 6.0 mg/L (normal, ≤ 5.0 mg/L). HIV antibody was negative. His hepatitis C antibody was positive, but his liver function tests were normal. Blood cultures were negative, except for one of six bottles that grew *Corynebacterium* sp, which was eventually dismissed as a contaminant.

MRI scans of the thoracic, lumbar and cervical spine were obtained, and the thoracic MRI showed a 10.3×0.6 cm anterior epidural abscess from T3 to T8, worst at T5–T7 (figure 1A,B). Diffuse enhancement of the meninges was also noted and this extended above and below the anterior abscess. No abnormalities of the lumbar or cervical spine

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Figure 1 MRI of the thoracic spine obtained on admission. (A) T2-weighted sagittal image of the thoracic spine showing a mass with high signal intensity and peripheral low signal intensity in an epidural or subdural location anterior to the spinal cord, from T3 to T7 (yellow arrows indicate the worst area, T5–T7). (B) T1-weighted sagittal image with fat suppression after intravenous gadolinium contrast, showing marked contrast enhancement of the mass and central necrosis, consistent with abscess formation (arrows).

were noted at the time of admission. The patient was taken to the operating room the next day for a laminectomy of T6–T8. The dura mater was very indurated and tense. When the dura was incised, pus was ejected with explosive force. Exploration revealed the infection was not epidural, but subdural, that is, in the intrathecal space. The spinal cord was abnormal in appearance, and despite irrigation of the intrathecal space to dislodge the pus no flow of cerebrospinal fluid (CSF) was observed during the surgery; therefore, no CSF specimen was available for analysis. Multiple cultures obtained during the surgery grew *C. albicans*. Cultures for aerobic and anaerobic bacteria and mycobacteria remained negative.

Postoperatively, the patient was paraplegic and had loss of sensation below the sixth thoracic dermatome (T6). He was started on intravenous fluconazole at 800 mg daily.

Antifungal susceptibilities were performed, and the *C. albicans* was fully susceptible to fluconazole (Minimum Inhibitory Concentration (MIC)=0.5 µg/mL), itraconazole, voriconazole and micafungin, but resistant to flucytosine (5-FC, MIC ≥64 µg/

Figure 2 MRI of the cervical spine obtained after 6 weeks of intravenous antifungal therapy. (A) T1-weighted sagittal image with contrast and fat suppression showing a small homogeneously enhancing epidural mass in the anterior epidural space at the level C7–T1 (thin yellow arrow). There is also leptomeningeal enhancement at the surface of the spinal cord, consistent with meningitis. (B) T1-weighted axial image, with fat suppression and following intravenous contrast, demonstrating a mass in the right anterior epidural space at the level of the C7–T1, with compression of the spinal cord (yellow arrow).

mL). After a week of intravenous fluconazole, the fluconazole was changed to oral at 800 mg daily and the patient was transferred to the rehabilitation unit of the hospital. Repeat MRI of the thoracic spine showed improvement during this time. Six weeks after the surgery, however, and while still receiving high-dose oral fluconazole treatment, he complained of new neck pain. His ESR, which had been normal on admission, had risen to 43 mm/hour, and the C reactive protein had risen to 126 mg/L. A repeat MRI of the neck was performed and showed new areas of diffuse enhancement inside the spinal canal compared with a previous study. The area of abnormal enhancement was most prominent at the level of the C7–T1 intervertebral disc (figure 2A,B) and once again showed compression of the spinal cord, especially the anterolateral aspect (figure 2B).

TREATMENT

The patient was taken back to the operating room for a second decompression operation using an anterior approach. He underwent discectomies of the C7–T1 and T1–T2 discs. Overt pus was once again found in the thecal sac at C7–T1. Cultures once again grew only *C. albicans*. Surprisingly, the organism was still fully susceptible to fluconazole with an unchanged MIC to that drug. Fortunately, the patient retained 5/5 strength in his upper extremities postoperatively, and his sensory level ascended only one level, to T5. His antifungal regimen was changed to liposomal amphotericin B at 5 mg/kg per day for 6 weeks, after

which oral fluconazole was resumed at 400 mg daily for 2 more months. He remained in the hospital on the spinal rehabilitation unit for 3 more months following the second surgery, receiving antifungal therapy the entire time. He was discharged home 5 months after admission on oral fluconazole. A judge granted him a medical parole.

OUTCOME AND FOLLOW-UP

Due to the paralysis that he suffered as a result of this unusual infection, our patient has been confined to a wheelchair since his initial illness 4 years ago. He has had problems with bedsores, as is common in patients with paraplegia, and required treatment for bacterial osteomyelitis of the left hip and sacrum. He has returned to a local college where he is working toward his bachelor's degree.

DISCUSSION

Our patient developed an unusual presentation of a rare disease.^{1,2} Although his MRI scans showed inflammation of the meninges, and infection was confirmed inside the subarachnoid space at surgery, he never had any of the usual signs of meningitis such as headache, stiff neck or any mental status changes. The best description of his infection might be 'intraspinous abscess' due to *C. albicans*, although others have used the term 'subdural granuloma' for this infection.³ Although our patient was not immunocompromised, he did receive several short courses of oral corticosteroids as well as intramuscular injections of methylprednisolone. Indeed, epidural injections of contaminated steroids prepared at the New England Compounding Center were the cause of an outbreak of fungal meningitis due to *Exserohilum rostratum* and *Aspergillus fumigatus* in Summer of 2012 in the USA.^{4,5} That outbreak and the subsequent recall had been completed before our patient became ill, and he never received any epidural injections.

Intravenous injection of street drugs has been associated with spinal and vertebral infections⁶ but our patient denied ever using drugs by vein. Vasoconstriction triggered by smoking cocaine could have predisposed him to infection if he had transient fungaemia from another source. Another puzzle in this case is when our patient actually acquired the infection. We initially assumed that he acquired this infection after the bicycle accident 4 months prior to his admission to our hospital. Review of his records, however, showed that he was having back and shoulder pain for months in the original jail, before the bicycle accident.

When his infection was diagnosed the first time, we treated him with fluconazole based on good experience with it in treating *cryptococcal meningitis*, as well as some cases of CNS candidal infection.⁷ When his infection relapsed and extended to the cervical spine, we were also surprised that the organism remained sensitive to the fluconazole he had been on for 6 weeks. Clearly, this drug was not reaching its intended target, probably due to walled off infection inside the spinal canal. Liposomal amphotericin B has been recommended as an antifungal drug

Patient's perspective

- I consented to the publication of this case report in the hope that other doctors will be able to diagnose and treat their patients with similar conditions.

Learning points

- Non-penetrating blunt trauma may be a risk factor for central nervous system (CNS) infections due to candidal yeasts.
- Fungal CNS infections can occur even without any exposure to contaminated injectable medications.
- Fungal CNS infections can occur even in the absence of immunocompromising conditions.
- Failure of antimicrobial therapy is often attributed to the development of resistance by the pathogen to the drug being administered. At the time of our patient's relapse, however, he was still culture positive and his *Candida albicans* was still fully susceptible to fluconazole that he was still receiving.

for CNS candidal infections^{2,8} and was used in this case after his relapse.

In summary, in this patient, non-penetrating blunt trauma to the back and intermittent systemic corticosteroid use might have contributed to the development of this rare *C. albicans* infection.

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