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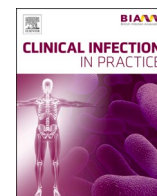
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Case Reports and Series

Simultaneous brain and intramedullary spinal abscesses in a patient with *Streptococcus intermedius* infection

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ABSTRACT

A male patient in his thirties presented to the hospital with meningismus and altered mental status. Cerebrospinal fluid (CSF) analysis confirmed meningitis, but no microorganisms were identified. Head imaging (MRI) revealed multiple brain abscesses. Surgically-collected brain specimens revealed Gram-positive cocci and subsequently grew *Streptococcus intermedius*. MRI of the thoracic spine subsequently also identified an intramedullary spinal abscess. While brain abscesses and spinal abscesses caused by *S. intermedius* have been previously reported, the extent of disseminated disease in the patient was noteworthy.

Patient case

A male patient in his thirties with a history of bipolar disorder presented to the emergency department with a 2-day history of headaches, posterior neck pain, photophobia, mild cough and bloody rhinorrhea. His family reported a 1-day history of mental status changes which included acting erratically, pacing around the house, and speaking incoherently. At the time of presentation he was taking aripiprazole and sertraline for bipolar disorder, and gabapentin for chronic back pain. Due to agitation in the emergency department, he was sedated and intubated for airway protection. The patient's family reported that he had no recent travel, intravenous drug use, or sick contacts. The patient was febrile on arrival with a temperature of 100.8F. The physical examination was unremarkable, but was limited due to sedation and intubation. The complete blood count demonstrated a WBC count of 21,200 cells/uL with neutrophilia (88%). Additional laboratory testing revealed hyponatremia (128 mg/dL), lactic acidosis (2.1 mmol/L), and elevated creatine kinase (616U/L).

A head CT (Fig. 1) without IV contrast revealed mild hydrocephalus and poor visualization of sulci. A lumbar puncture was performed prior to the administration of antibiotics. CSF analysis revealed an RBC count of 1,013 cells/uL and a WBC count of 26,796 cells/uL, consisting of 78% neutrophils, 19% macrophages, and 3% lymphocytes. The CSF glucose was 19 mg/dL (normal range 40–70 mg/dL) and CSF protein was 337 mg/dL (normal range 15–45 mg/dL). The opening pressure was 26 mm Hg and the closing pressure was 18 mm Hg. Gram stain of the CSF

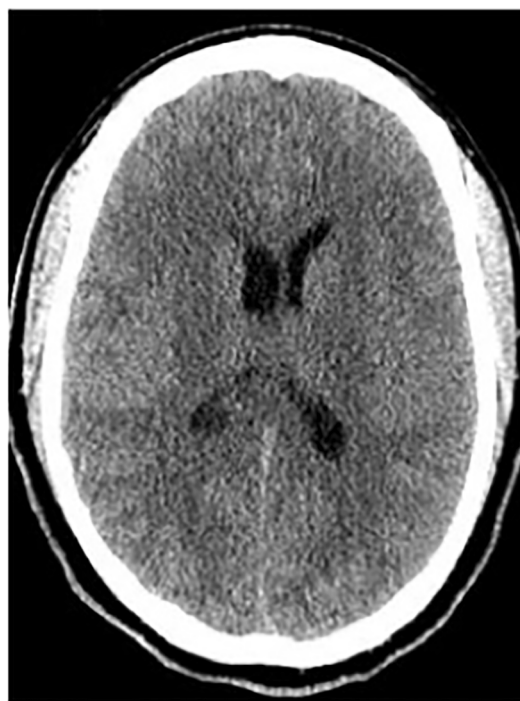


Fig. 1. Axial CT head at presentation which demonstrates mild hydrocephalus and poor visualization of sulci.

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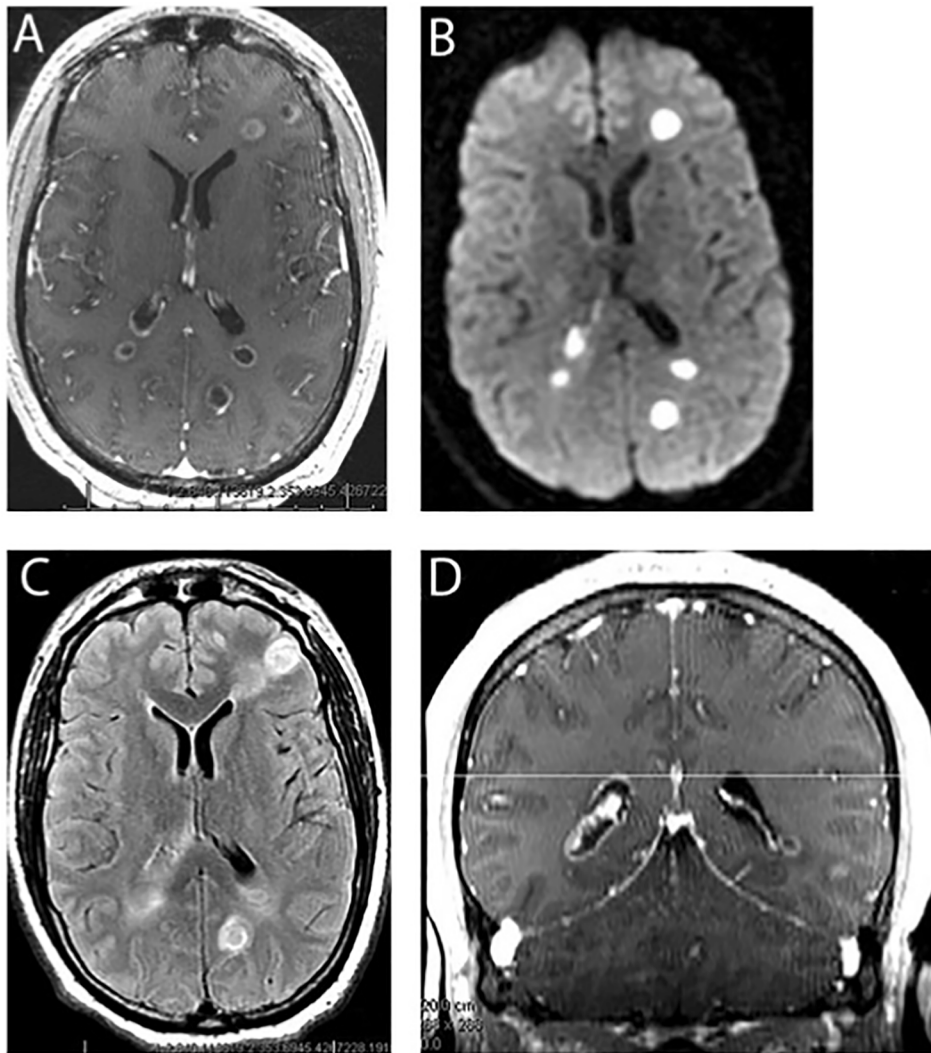


Fig. 2. A: Axial enhanced MRI brain, B: Axial diffusion MRI brain, C: Axial FLAIR MRI brain, D: Coronal enhanced MRI brain.

revealed many WBCs but no organisms. A molecular syndromic meningitis/encephalitis panel was performed but did not identify any organisms.

He was started on broad spectrum antibiotics for meningitis, including vancomycin, ceftriaxone, ampicillin, and acyclovir.

A subsequent enhanced MRI of the brain demonstrated multiple, thin-walled, rim enhancing parenchymal lesions in the bilateral cerebral hemispheres (Fig. 2A), with associated diffusion restriction (Fig. 2B) and surrounding FLAIR hyperintensity representing vasogenic edema (Fig. 2C). Ependymal enhancement involved the right lateral ventricle (Fig. 2D). The constellation of findings was most consistent with multiple brain abscesses with associated ependymitis.

Blood and CSF cultures were performed, but were negative for growth of organisms. Transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) were performed to exclude endocarditis, but were negative for valvular vegetations. The TTE did not reveal evidence of a patent foramen ovale upon agitated saline injection. CT of the head showed a small retention cyst in the left sphenoid sinus, but otherwise clear paranasal and mastoid sinuses. A CT angiogram of the chest did not identify arterio-venous malformations or evidence of pulmonary infection. In addition, a CT of the abdomen and pelvis with IV contrast failed to identify an intra-abdominal or pelvic source of infection. There was significant neurologic improvement and he was extubated on hospital day 2. Headache and photophobia improved by hospital day 5. Examination of the dentition was

unremarkable. On hospital day 7, a small left temporal craniotomy was performed utilizing stereotactic navigation for the purpose of obtaining tissue and cultures.

Multiple surgically collected swabs from the brain abscesses were submitted to the microbiology lab. The Gram stain of the swabs revealed Gram-positive cocci in pairs and chains. Multiple cultures, both aerobic and anaerobic, grew alpha-hemolytic, pinpoint, dry colonies on blood and chocolate agar on days 2 and 3 respectively. The Gram stain of the culture showed Gram-positive cocci in chains. The colonies were identified as *Streptococcus intermedius* by MALDI-TOF mass spectrometry, and were also noted by the lab technologist to smell strongly of butterscotch, typical of *Streptococcus anginosus* group. The organism failed to thrive for susceptibility testing.

With the identification of *S. intermedius* from the brain abscess, vancomycin was discontinued on hospital day 9. The patient began to endorse thoracic paravertebral back pain on hospital day 12. The neurological examination revealed intermittent beats of clonus in the bilateral ankles, and 3 + patellar reflexes bilaterally. Enhanced MR imaging of the thoracic spine revealed extensive T2 hyperintensity, representing vasogenic edema, in the thoracic cord (Fig. 3A), with a rim enhancing lesion centered at T5 and T6 (Fig. 3B, 3C); simultaneous involvement of the brain and thoracic cord is seen in Fig. 3B. These findings were most consistent with an intramedullary abscess. Neurosurgical consultation recommended initial treatment with intravenous antibiotics. The patient was maintained on ceftriaxone and showed

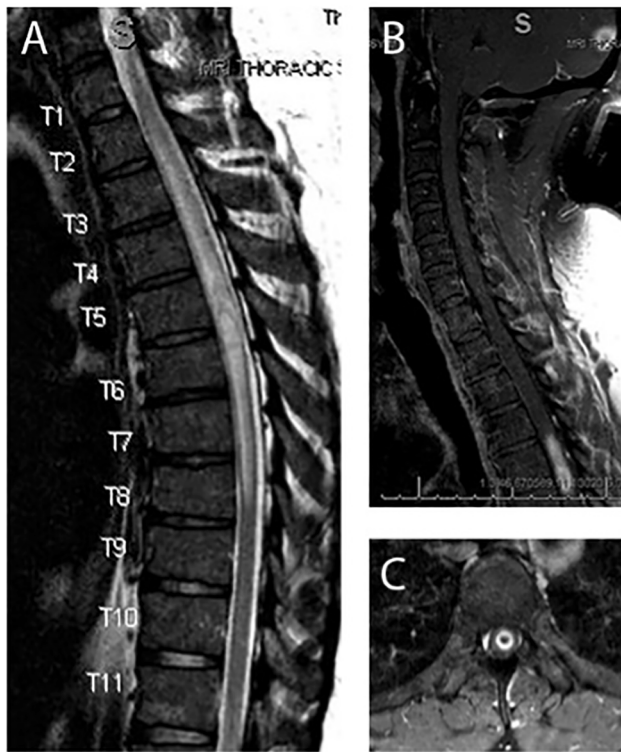


Fig. 3. A: Sagittal T2 thoracic spine, B: Sagittal enhanced cervical spine and upper thoracic spine (shows both brain and cord lesions), C: Axial enhanced thoracic spine.

continued clinical improvement, eventually being discharged on hospital day 17. Ceftriaxone was continued for a total of 6 weeks. An MRI of the spine performed at the end of the antibiotic course revealed complete resolution of the intramedullary abscess.

Discussion

Streptococcus intermedius is in the *Streptococcus anginosus* group (other members are *S. constellatus* and *S. anginosus*, formerly referred to as *S. milleri* group). The organism can be a component of normal microbiota at various mucosal sites, including the oral cavity, genitourinary system, and gastrointestinal tract (Whiley et al., 1992). There is evidence of *S. intermedius* abscess occurring after dental manipulation, due to bacteremia and subsequent hematogenous seeding of distal sites (Livingston and Perez-Colon, 2014). *S. intermedius* also causes

dentoalveolar infections and infective endocarditis (Tran et al., 2008). *S. intermedius* and other members of the group are known to cause disseminated abscesses, mainly in the brain, spine, and liver (Whiley et al., 1992; Al Masalma et al., 2009; Mishra and Fournier, 2013). Compared to infections caused by other *S. anginosus* group members, serious *S. intermedius* infections may have longer hospital stays and higher mortality rate (Junckerstorff et al., 2014).

There are multiple case reports of either brain or spinal abscesses caused by *S. intermedius*. However, to our knowledge, concurrent brain and spinal abscess in a patient with disseminated *S. intermedius* infection has not been reported previously, and is exceedingly rare regardless of the causative agent. A 2011 case report also reviewed 54 published cases of intramedullary spinal cord abscess between 1977 and 2009 (Iwasaki et al., 2011), and among them one case was noted to involve concomitant intramedullary abscess and brain abscesses, which were caused by *Prevotella disiens* (formerly named *Bacteroides disiens*) (Erlich et al., 1992). Although our patient recovered without surgical intervention for the spinal abscess, it should be noted that concurrent disseminated infections with these organisms may occur and imaging revealing either spinal or brain abscesses may prompt evaluation of other anatomical sites.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Whiley, R.A., Beighton, D., Winstanley, T.G., Fraser, H.Y., Hardie, J.M., 1992. *Streptococcus intermedius*, *Streptococcus constellatus*, and *Streptococcus anginosus* (the *Streptococcus milleri* group): association with different body sites and clinical infections. *J Clin Microbiol* 30 (1), 243–244.
- Livingston, L.V., Perez-Colon, E., 2014. *Streptococcus intermedius* Bacteremia and Liver Abscess following a Routine Dental Cleaning. *Case Rep Infect Dis* 2014, 954046.
- Tran, M.P., Caldwell-McMillan, M., Khalife, W., Young, V.B., 2008. *Streptococcus intermedius* causing infective endocarditis and abscesses: a report of three cases and review of the literature. *BMC Infect Dis* 8, 154.
- Al Masalma, M., Armougom, F., Scheld, W.M., Dufour, H., Roche, P.-H., Drancourt, M., Raoult, D., 2009. The expansion of the microbiological spectrum of brain abscesses with use of multiple 16S ribosomal DNA sequencing. *Clin Infect Dis* 48 (9), 1169–1178.
- Mishra, A.K., Fournier, P.-E., 2013. The role of *Streptococcus intermedius* in brain abscess. *Eur J Clin Microbiol Infect Dis* 32 (4), 477–483.
- Junckerstorff, R.K., Robinson, J.O., Murray, R.J., 2014. Invasive *Streptococcus anginosus* group infection—does the species predict the outcome? *Int J Infect Dis* 18, 38–40.
- Iwasaki, M., Yano, S., Aoyama, T., Hida, K., Iwasaki, Y., 2011. Acute onset intramedullary spinal cord abscess with spinal artery occlusion: a case report and review. *Eur Spine J* 20 (Suppl 2), S294–S301.
- Erlich, J.H., Rosenfeld, J.V., Fuller, A., Brown, G.V., Wodak, J., P. Tress, B., 1992. Acute intramedullary spinal cord abscess: case report. *Surg Neurol* 38 (4), 287–290.