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Case Report

Subdural empyema caused by *Morganella morganii*

Evalina Bond, James A. Stadler, III

Department of Neurological Surgery, University of Wisconsin-Madison, Madison, Wisconsin, United States.

E-mail: Evalina Bond - esbond@wisc.edu; *James Andrew Stadler - stadler@neurosurgery.wisc.edu

***Corresponding author:**
James A. Stadler, III, MD, Department of Neurological Surgery, University of Wisconsin-Madison, Madison, Wisconsin, United States.

stadler@neurosurgery.wisc.edu

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ABSTRACT

Background: *Morganella morganii* is a species of Gram-negative enteric rod found in normal human gut flora. Pathologically, this most often presents as urinary tract infections, wound infections, and bacteremia. It is highly uncommon for *M. morganii* to be implicated in a central nervous system infection, with only 12 reported cases of parenchymal abscesses or meningitis.

Case Description: A previously healthy 13-month-old female presented with fever of unknown origin and had a witnessed seizure during evaluation. A large left subdural fluid collection was identified, and the patient underwent emergent burr hole drainage and subdural drain placement. Cultures demonstrated *M. morganii* empyema, and she subsequently completed a course of directed antibiotics. Six months following surgery, she has no further clinical or radiographic evidence of infection, seizures, or neurological sequelae.

Conclusion: We describe the first reported case of isolated subdural empyema caused by *M. morganii*. The child was successfully treated with the evacuation of the empyema and direct antibiotics with no lasting neurological injury.

Keywords: Infection, *Morganella morganii,* Pediatric neurosurgery, Subdural empyema

INTRODUCTION

Subdural empyema (SE) is a pyogenic fluid collection that can result in rapid and significant cerebral compression, while rare, these infections represent neurosurgical emergencies.[3] In the pediatric population, SE often develops as a complication of bacterial meningitis, sinusitis, and otitis media infections, with meningitis being more common among infants compared to older children.[9] The most common bacterial agents responsible for SEs are anaerobic and microaerobic streptococci, with *Staphylococcus aureus* as the next most common.[4] Therefore, it is especially notable when an uncommon agent is identified in these subdural collections. One such uncommon agent is the Gram-negative rod, *Morganella morganii*. *Morganella* species are frequently found in normal human and mammal gut flora.[6] Its infectious potential most often presents as urinary tract infections, wound infections, and bacteremia.[6] This bacterial species is only rarely associated with central nervous system infections, with only 12 documented cases of brain abscesses and meningitis caused by *M. morganii*.[1,2,7,8,10-17] Two of these reported patients had coexistent SE secondary to the primary infection, but isolated SE cause by *M. morganii* has not been previously reported [Table 1]. Here, we present a case of an isolated SE caused by *M. morganii* in a previously healthy, immunocompetent 13-month-old female.

Table 1: Summary of previously reported *Morganella morganii* CNS infections.

Citation	Patient age	Primary CNS infection	Subdural empyema
Abdalla *et al.* (2006)[1]	38 years	Parenchymal abscess	No
Águeda *et al.* (2013)[2]	9 years	Parenchymal abscess	Yes
Mastroianni *et al.* (1994)[7]	45 years	Meningitis	No
Milligan and Barenkamp (2013)[8]	3 weeks	Meningitis	No
Ndiaye *et al.* (2010)[10]	12 years	Meningitis	No
Park *et al.* (2004)[11]	7 months	Meningitis	Yes
Patil *et al.* (2012)[12]	12 years	Parenchymal abscess	No
Rau *et al.* (2002)[13]	N/A	Parenchymal abscess	No
Samonis *et al.* (2001)[14]	N/A	Meningitis	No
Sinha *et al.* (2006)[15]	6 days	Meningitis	No
Thomas *et al.* (2007)[16]	2 months	Meningitis	No
Verboon-Maciolek *et al.* (1995)[17]	8 days	Parenchymal abscess	No

CNS: Central nervous system

CASE DESCRIPTION

A 13-month-old female with no significant prior medical history, prior significant infections, or developmental concerns presented with worsening fatigue and intermittent fevers. The initial evaluation demonstrated leukocytosis, anemia, and elevated inflammatory markers. Infectious evaluation, including chest X-ray, monospot test, rapid streptococcal screen, HSV testing, and UA, was unremarkable. A viral etiology was considered most likely and the patient was discharged home with return precautions. Over the following week, the patient had no significant improvement, and she was admitted to the hospital for further evaluation after repeated laboratory investigations yielded similar results.

On admission, her symptoms included intermittent fevers with concurrent irritability, fatigue, and decreased solid food intake; she appeared at her baseline when not febrile. No signs or symptoms of localized infection were present at that time, and her family denied sick contacts. On the morning following admission, the patient experienced a right upper extremity focal seizure requiring prompting immediate brain MRI. MRI demonstrated an extensive left subdural fluid collection consistent with a subdural hematoma and associated left to right midline shift [Figure 1]. Several posterior components of the fluid collection demonstrated diffusion restriction and raised suspicion for the superinfection of the hematoma. Blood cultures were sent, and the patient was taken for immediate surgical evacuation with ultrasound-assisted burr hole drainage and subdural drain placement. Intraoperatively, the drained fluid was consistent with chronic blood products with foul-smelling superimposed infection. The fluid was collected for microbial analysis, and the patient was started on empiric antimicrobial coverage. The fluid cultures demonstrated *M. morganii,*

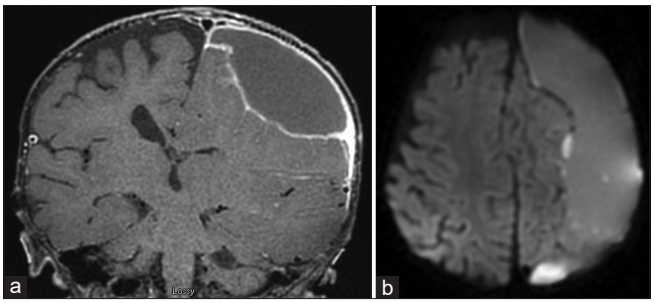

Figure 1: Preoperative MRI with coronal T1 postcontrast (a) and axial diffusion-weighted images (b) showing a large left subdural fluid collection concerning for hematoma with superimposed empyema and associated mass effect.

and the antibiotic regimen was subsequently converted to meropenem monotherapy. Blood cultures and subdural fungal cultures remained negative at 5 and 28 days, respectively.

Given the concern for a chronic subdural hematoma, the patient underwent further trauma evaluation, including retinal examination, skeletal survey, skin examination, and spine MRI which were all unremarkable. MR angiogram showed no evidence of underlying high flow vascular abnormality. Further, history revealed potential trauma 2 weeks before the onset of symptoms, when the patient tipped over in a toy car onto cement; no other history of trauma was identified. Repeat imaging the day after surgery demonstrated near-complete decompression of the left hemisphere [Figure 2]. Clinically, the patient returned to her behavioral baseline, and the fevers resolved after surgery. She was discharged from the hospital 8 days after surgery with a 6-week treatment course of intravenous meropenem. Six months after her surgery, she continues to do well with normal development, no further seizures, and no residual imaging abnormalities on MRI.

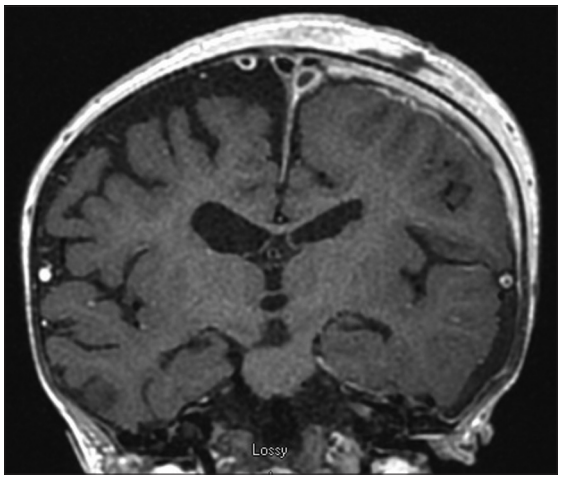

Figure 2: Postoperative MRI with interval evacuation of the infected fluid collection and resolved mass effect.

DISCUSSION

Morganella species is uncommon causes of disease in humans and is notably rare as intracranial pathogens. In a review of the literature, there are 12 prior reports of *M. morganii* intracranial infections, with all prior described cases being parenchymal abscesses or meningitis.[1,2,7,8,10-17] Here, we report the first case description of isolated SE caused by *M. morganii*.

While the underlying source for this infection remains unclear, the clinical and radiographic findings suggest a superimposed infection of a chronic subdural hematoma. Interestingly, blood is one of two agar media frequently used to culture *Morganella* species for diagnosis, with the other being MacConkey agar. Alternatively, given the novel presentation and uncertain premorbid trajectory, in this case, hemorrhagic expansion of the subdural space secondary to the infection itself remains possible. The etiology of this infection is even more obscured by the patient's immunocompetence and lack of extracranial infection.

The patient, in this case, responded well to traditional management of the SE with emergent surgical drainage and directed antibiotic therapy. Surgical approaches to SEs typically favor craniotomy to ensure complete evacuation of the infection, though, in this patient, the homogenous fluid signal on imaging and intraoperative ultrasound confirmation of appropriate resolution allowed burr hole drainage.[5]

CONCLUSION

We describe the first reported case of isolated SE caused by *M. morganii*. In this patient, the infection possibly represented a superinfection of a chronic subdural hematoma. This case description adds to the minimal literature regarding *M. morganii* as a rare intracranial pathogen and reports a novel presentation of this pathogen with isolated SE.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Abdalla J, Saad M, Samnani I, Lee P, Moorman J. Central nervous system infection caused by *Morganella morganii*. Am J Med Sci 2006;331:44-7.
2. Águeda S, Leitão A, Rocha G, Guimarães H. Cerebral abscess and empyema due to *Morganella morganii*. Pediatr Ther 2013;3:147.
3. Gupta S, Vachhrajani S, Kulkarni AV, Taylor MD, Dirks P, Drake JM, *et al*. Neurosurgical management of extraaxial central nervous system infections in children. J Neurosurg Pediatr 2011;7:441-51.
4. Jim KK, Brouwer MC, van der Ende A, van de Beek D. Subdural empyema in bacterial meningitis. Neurology 2012;79:2133-9.
5. Konar S, Gohil D, Shukla D, Sadashiva N, Uppar A, Bhat DI, *et al*. Predictors of outcome of subdural empyema in children. Neurosurg Focus 2019;47:E17.
6. Liu H, Zhu J, Hu Q, Rao X. *Morganella morganii*, a non-negligent opportunistic pathogen. Int J Infect Dis 2016;50:10-7.
7. Mastroianni A, Coronado O, Chiodo F. *Morganella morganii* meningitis in a patient with AIDS. J Infect 1994;29:356-7.
8. Milligan KL, Barenkamp SJ. Neonatal meningitis due to Morganella morganii. Clin Pediatr (Phila) 2013;52:462-4.
9. Muzumdar D, Biyani N, Deopujari C. Subdural empyema in children. Childs Nerv Syst 2018;34:1881-7.
10. Ndiaye M, Sène MS, Sow AD, Seck LB, Coulibaly T, Diagne NS, *et al*. Meningoencephalitis due to *Morganella morganii*: A case report. Bull Soc Pathol Exot 2010;103:230-2.
11. Park EY, Lee SJ, Oh PS, Kim KN, Moon SM. A case of subdural abscess caused by *Morganella morganii*. Clin Exp Pediatr 2004;47:1024-7.
12. Patil AB, Nadagir SD, Lakshminarayana S, Syeda FM. *Morganella morganii*, subspecies morganii, biogroup a: An unusual causative pathogen of brain abscess. J Neurosci Rural Pract 2012;3:370-2.
13. Rau CS, Chang WN, Lin YC, Lu CH, Liliang PC, Su TM, *et al*. Brain abscess caused by aerobic Gram-negative *Bacilli*: Clinical features and therapeutic outcomes. Clin Neurol Neurosurg 2002;105:60-5.

14. Samonis G, Anatoliotaki M, Apostolakou H, Souglakos J, Georgoulias V. Fatal septicemia and meningitis due to *Morganella morganii* in a patient with Hodgkin's disease. Scand J Infect Dis 2001;33:553-5.
15. Sinha AK, Kempley ST, Price E, Sharma BK, Livermore DM. Early onset *Morganella morganii* sepsis in a newborn infant with emergence of cephalosporin resistance caused by depression of AMPC beta-lactamase production. Pediatr Infect Dis J 2006;25:376-7.
16. Thomas VA, Sathish KT, Agarwal I, Chacko AG. Unusual cause of brain abscess in an infant. J Pediatr Neurosci 2007;2:94-5.
17. Verboon-Maciolek M, Vandertop WP, Peters AC, Roord JJ, Geelen SP. Neonatal brain abscess caused by *Morganella morgagni*. Clin Infect Dis 1995;20:471.

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