



## Case report

# *Mycobacterium abscessus* peritonitis and ventriculitis associated with ventriculoperitoneal shunt

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## ABSTRACT

*Mycobacterium abscessus*, like most nontuberculous mycobacteria, is a pervasive organism. It frequently presents as a healthcare-associated infection. *Mycobacterium abscessus* infections are notoriously difficult to treat, requiring multidrug regimens and a prolonged treatment course. The patient is a 39 year old hispanic female with a history of pseudotumor cerebri with ventriculoperitoneal shunt which had recently been removed due to concern for infection. She presented with complaints of headaches, blurry vision, nausea, vomiting, slowed speech, inability to void and difficulty with memory. One month into this hospitalization, a new shunt was placed for symptomatic hydrocephalus. She began to exhibit signs of clinical worsening with confusion and echolalia, so her shunt was removed. Intraoperatively the peritoneal catheter of the shunt was noted to have a viscous secretion around it. Cultures of this fluid and samples from the cerebrospinal fluid grew *Mycobacterium abscessus*. Shunt-associated central nervous system infections with *Mycobacterium abscessus* are rare and difficult to treat. Treatment of *M. abscessus* is complicated by inducible macrolide resistance and some inherent resistance to many antibiotics.

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## Introduction

*Mycobacterium abscessus*, like most nontuberculous mycobacterium, is a pervasive organism [1]. It frequently presents as a healthcare associated infection, and has been associated with many types of procedures, from abdominoplasty to cardiac surgery and dialysis [1–3]. This is likely due in part to their presence in the water supply as well as their resistance to most disinfectants utilized in the healthcare setting, such as chlorine and 2% formaldehyde solutions [4]. *Mycobacterium abscessus* infections are notoriously difficult to treat, requiring multiple antibiotics and prolonged treatment course [1]. We present a case of peritonitis and ventriculitis of *mycobacterium abscessus* associated with ventriculoperitoneal shunt.

## Case presentation

The patient is a 39 year old hispanic female with a history of pseudotumor cerebri and recently placed lumbar peritoneal shunt. Eighteen days after it was placed she presented to the Emergency

Department (ED) with extrusion of the shunt from her lumbar spine. She went to OR for revision of the shunt the same day.

One month later the patient presented with chills and complaints of pus coming out of her shunt wound. On exam her right lower quadrant and lumbar surgical wounds were draining a small amount of clear/whitish discharge. Her shunt was removed due to concern for infection. She was discharged on doxycycline.

Three weeks later she presented again with complaints of pus coming out of her lumbar surgical site, headaches, blurry vision, abdominal pain, vomiting, slowed speech, inability to void, and difficulty with memory. She was alert and oriented to person, place, and day on admission. On exam her lumbar surgical wound had minimal serous drainage and no erythema. One month into this hospitalization, right-sided Ventriculoperitoneal (VP) shunt was placed for symptomatic hydrocephalus.

The patient exhibited signs of clinical worsening with confusion and echolalia. Thirty nine days after her VP shunt placement she received a left-sided extraventricular drain. This drain was removed four days later. Nineteen days after this her right-sided VP shunt was removed and intraoperatively the peritoneal catheter was noted to have a viscous secretion around it. Samples of this fluid grew *Mycobacterium abscessus*. A separate sample from the CSF grew *Mycobacterium abscessus*, confirming the presence of the organism centrally. She also had enhancement of the lateral ventricles on CT scan as shown in Fig. 1.

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**Fig. 1.** CT of the head demonstrates significant enhancement of the ventricles bilaterally.

On CT abdomen her shunt tract demonstrated a focal subcutaneous collection in the right anterior abdominal wall measuring  $4.9 \times 1.4 \times 1.4$  cm concerning for abscess. On exam she was moderately tender to palpation in the right lower quadrant and brown-tinged pus was expressed from the adjacent surgical wound. She did not show signs of sepsis, thus treatment of the *Mycobacterium abscessus* was not initiated until sensitivities resulted. The isolate was susceptible to amikacin, clarithromycin, imipenem, linezolid, minocycline, and moxifloxacin.

One month after shunt removal she was started on a regimen of PO azithromycin, IV amikacin, intraventricular amikacin, IV cefoxitin, IV tigecycline, and IV moxifloxacin. Tigecycline was discontinued after 10 days of therapy due to intolerance. Three weeks after initiating antibiotics the patient underwent aspiration of her subcutaneous abdominal fluid collection. This fluid was negative for acid fast bacilli by culture. Her mental status continued to fluctuate and on many days the patient was lethargic and did not follow commands or answer orientation questions.

Her intraventricular amikacin was discontinued and a new VP shunt was placed in preparation for discharge. Her course was complicated by seizures, DVT, PE, portal vein thrombosis, bradycardia, and adrenal crisis. Four months after her antibiotics were initiated, the patient passed away due to her multiple comorbidities.

## Discussion

*Mycobacterium abscessus* is a nontuberculous mycobacteria (NTM), a group of over 170 species of which more than half are considered to be pathogenic in humans. It is one of the rapidly growing mycobacteria (RGM), as opposed to the other most commonly reported clinically relevant NTM species, *Mycobacterium kansasii* and *Mycobacterium avium* complex (MAC), which are slow growing mycobacteria. In the United States, *M. abscessus* is the third most common cause of NTM pulmonary disease and a common cause of community-acquired NTM skin and soft tissue infections [5].

The Clinical and Laboratory Standards Institute (CLSI) recommends susceptibility testing to include amikacin, cefoxitin, ciprofloxacin, clarithromycin, doxycycline/minocycline, imipenem, linezolid, moxifloxacin, trimethoprim-sulfamethoxazole and tobramycin [6]. Clarithromycin is often the mainstay of treatment for localized disease caused by *M. abscessus*, but inducible macrolide resistance has become an emerging problem. Due to the presence of the erythromycin ribosome methyltransferase (*erm*) gene in some species of RGM, it is recommended to wait a full 14 days for final susceptibility reads for Clarithromycin, rather than the typical five days for other antibiotic choices [6]. Confirmed presence of the *erm* gene is particularly problematic as it usually indicates resistance against all other tested oral antibiotics.

Most data on *M. abscessus* treatment is from pulmonary infections, as *M. abscessus* is the causative agent of more than 80% of pulmonary disease due to RGM [7]. Optimal duration of antibiotic therapy for NTM soft tissue infections is unclear, though for pulmonary infections, duration of antibiotic therapy is often around 12 months [1]. Often, a triple regimen of oral Clarithromycin with Amikacin and either Cefoxitin, Imipenem or Tigecycline is used.

For strains without a functional *erm* gene, the IV part of the antibiotic regimen may only be needed for the first two to eight weeks, while remaining on the oral macrolide for the duration of therapy. In the case of *erm*-induced macrolide resistance, treatment with antibiotics alone is rarely successful, with the above regimen often producing clinical improvement without resolution of infection [5]. Patients with *erm*-positive *M. abscessus* infections may require surgical intervention for permanent disease control [7].

It is uncommon for nontuberculous mycobacterium to cause CNS infections [8]. There have been three other case reports of VP shunt associated ventriculitis with *Mycobacterium abscessus*, but there are no case reports of VP shunt associated ventriculitis and peritonitis with *Mycobacterium abscessus* in the same patient. There is one case report of *M. abscessus* shunt infection in a 30 year old man with a VP shunt who presented with nausea, vomiting, and lethargy [8].

The second case report was a 67 year old woman who developed drainage from her abdominal site, altered mental status, leukocytosis, and fever 15 days after receiving her second VP shunt [9]. The third case report is a 97 year old woman who presented with drainage from her surgical site after shunt revision [10].

Cerebrospinal fluid infections are a common complication of shunt implantation [11]. It stands to reason that in this case, each time the patient went to the OR for shunt implantation, revision, removal, and re-implantation, she increased her risk of infection. Our case is consistent with current theories about shunt-associated infections, including that surgical manipulation is a major risk factor.

## Conclusion

We present a case of ventriculoperitoneal shunt associated infection with *mycobacterium abscessus* that presented with mental status changes, purulent surgical site drainage, and peritonitis. In every reported case, shunt-associated ventriculitis with *M. abscessus* was difficult to treat. Three of the four cases involved recent surgical manipulation or placement of the shunt. CNS infections with nontuberculous mycobacterium should be on the differential for a patient with a history of neurosurgical manipulation, specifically VP shunts.

## CRediT authorship contribution statement

**Diana Clabots:** Writing – review & editing. **Alejandro Serrat:** Writing – original draft, Writing – review & editing.

**Ethical approval**

Not applicable.

**Consent**

Patient's next of kin, her brother has given written consent for publication of the case report and accompanying images, available for review upon request.

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**Note**

Regarding ethical approval, written informed consent has been obtained by the patient's family for publication of this case report and accompanying images, available for review upon request.

**Author statement**

We declare that this manuscript is original, has not been published before, and is not being considered for authorship elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors of the manuscript has been approved by all of us.

We understand that the Corresponding Author is the sole contact for the editorial process. He/She is responsible for communicating with the other authors about the progress, submissions of revisions and final approval of proofs.

**Conflicts of interest**

All authors have declared no conflict of interest for this case report.

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