CASE REPORT

Misidentification of *Mycobacterium fortuitum* in an immunocompetent patient presenting with a unilateral neck mass

Todd Kanzara, Andy Hall, Simon Namnyak, Tony Owa

1Department of Surgery, East and North Hertfordshire NHS Trust, Stevenage, Hertfordshire, UK
2Department of ENT, Northwick Park, Harrow, London, UK
3Department of Microbiology, Queens Hospital, Romford, Essex, UK
4Department of ENT, Queens Hospital, Romford, Essex, UK

**Correspondence to**
Dr Todd Kanzara, ktoddt@gmail.com

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**SUMMARY**

A 31-year-old African man with a blameless medical history presented with an enlarging neck swelling of 6 months duration. He was systemically well with normal haematobiochemistry. MRI of the neck demonstrated abnormal signalling in the subcutaneous fat overlying the posterior spinal muscles in the midline and the left sternocleidomastoid muscle. Scanty growth of *Rhodococcus equi* was reported from a turbid fine needle aspirate of the neck on two separate occasions. The swelling progressed despite numerous antibiotic combinations which necessitated surgical debridement. Analysis of debrided tissue using 16S rDNA surprisingly identified *Mycobacterium fortuitum*, not *R equi*, thereby resolving our diagnostic conundrum.

**BACKGROUND**

This case highlights the superiority of molecular methods of bacterial identification, in this instance 16S rDNA, over traditional methods which focus on bacterial phenotypes. This is especially pertinent when investigating patients presenting with unusual or less-encountered genera. Molecular testing, although expensive and unavailable routinely allows immediate and accurate bacterial identification which in turn leads to the patient receiving prompt treatment with the correct antibiotics. Furthermore, surgical debridement is a very useful adjunct when treating non-healing soft tissue infections because it yields tissue and pus for culture.

**CASE PRESENTATION**

An immunocompetent 31-year-old African-American man presented with a 6-month history of progressive left neck swelling originating from the occiput and tracking along the anterior border of the sternocleidomastoid muscle terminating next to the thyroid cartilage. He had attended a hospital in Nigeria at the onset of his symptoms and following a fine-needle aspiration and culture ‘a virus’ had been implicated.

**INVESTIGATIONS**

Initial haematobiochemical parameters and a chest radiograph were normal. MRI showed abnormal signalling in the subcutaneous fat overlying the posterior spinal muscles in the midline and the left sternocleidomastoid muscle with no muscular infiltration (figure 1). Initial analysis of a fine-needle aspirate showed acute and chronic inflammatory cells with no organism seen on Gram stain and culture. No microorganisms were identified using periodic acid Schiff with and without diastase, Gram stain, Giemsa stain and Ziehl-Neelsen stain. Despite the negative Ziehl-Neelsen without demonstration of acid-fast bacilli a *Mycobacterium* infection was suggested.

Subsequent analyses of further samples of neck fluid showed scanty pus cells and moderate growth of *Rhodococcus equi* on Analytic Profile Index. This necessitated investigating the patient’s immune status. Results for HIV, toxoplasmosis, cytomegalovirus, bartonella serology, antistaphylococcal and antistreptococcal antibodies were negative.

Histopathological analysis of tissue obtained at surgery demonstrated granulomatous necrotising inflammation with abscess formation (figure 2).

Tissue and fluid obtained at surgery were sent to our reference laboratory for culture and susceptibility testing. *Mycobacterium fortuitum* was identified using molecular identification with 16S rDNA. Crucially, an antibiogram was also performed which led to the patient receiving appropriate treatment.
susceptibility testing.

samples sent to our reference laboratory for identi-

respectively. He is disease-free after a year of treatment.

minimal inhibitory concentrations of 0.25 and 0.065 mg/L,

and moxi-

patient was treated with oral clarithromycin 500 mg twice daily

and gentamicin on susceptibility testing.

The reference laboratory analysed the samples using 16S rDNA

testing.

The response to varying antibiotic combinations from the sen-

sitivities was minimal. A senior ear nose and throat consultant

took over the patient’s care and promptly performed surgical

exploration.

At surgery an indurated area was noted from the left occiput

to the sternum with involvement of the sternocleido-

mastoid muscle. Inflammatory tissue was debrided and pus evac-

uated. Larger samples of inflammatory tissue were obtained and

samples sent to our reference laboratory for identification and

susceptibility testing.

OUTCOME AND FOLLOW-UP

The reference laboratory analysed the samples using 16S rDNA

sequencing. M fortuitum was isolated. It was shown to be sensi-
tive to teicoplanin, linezolid, tetracycline, clarithromycin and

moxifloxacin using the Kirby Bauer disc diffusion method. The

patient was treated with oral clarithromycin 500 mg twice daily and

moxifloxacin 400 mg once daily for 4 months based on the minimal inhibitory concentrations of 0.25 and 0.065 mg/L, respectively. He is disease-free after a year of treatment.

DISCUSSION

M fortuitum, is a Gram-positive, non-spore forming bacillus belonging to the species of the rapidly growing Runyon Group IV non-tuberculous mycobacteria (NTM). M fortuitum is a common inhabitant of the environment and has been isolated in natural water, tap water, soil and dust.

M fortuitum is an infrequent human pathogen causing opportuni-
tistic infections mostly in immunocompromised patients or those with chronic illness. Infections in the immunocompetent have been reported but are less common. Primary skin and soft tissue infections due to M fortuitum occur because of surgical wound infections and catheter sepsis. Commonly, there is a history of accidental injury, or nosocomial injuries with a contaminated implement which introduces the infection. Distal sequelae and deep organ involvement are rare in the immunocompetent where infection is limited with minimum mortality but variable morbidity. The respiratory system is usually spared in M fortuitum infections and chest radiographs are usually normal distinguishing it from tuberculous infections which have a proclivity to cause respiratory and systematic diseases.

Reported head and neck manifestations include acute and chronic otitis media, mastoiditis and cervical lymphadenitis which commonly occurs in otherwise healthy children. Of note, these were nosocomial infections differing significantly from our case where the source of the infection was unexplained.

Unusually, our laboratory identified R equi on two separate samples tested by two different biomedical scientists. R equi (formerly Corynebacterium equi) is a Gram-positive cooccocbac-

rus that tends to cause respiratory tract infections in animals (especially young foals) and humans but can also cause soft tissue infections. With our patient having a history of riding wild horses before the onset of the infection we concluded that the right pathogen had been isolated. R equi is known to inhabit macrophages and treatment with macrophage-penetrating antibiotics is key. These include erythromycin, rifampin, fluoroquinolones, aminoglycosides, glycopeptides and imipenem.

RGM can occasionally exhibit microscopic features of Corynebacterium and Nocardia species leading to misidentification and attendant morbidity and mortality. Of note, there has been a case report of catheter-related sepsis where M fortuitum specifically was initially misidentified as Corynebacterium jeikeium with the correct identification confirmed using 16S rRNA.

Our experience mandates a high index of suspicion for misidentifica-
tion when faced with unusual or unresponsive infections especially where Corynoba-

teria and NTM species are implicated. In such cases more novel molecular tests like 16S rDNA sequence analysis used by our reference laboratory but unavailable locally, can be crucial in the accurate identification of unusual organisms resulting in patients receiving the correct treatment immediately. Furthermore, such methods, although expensive and currently unavailable widely, play a key role in the discovery of novel genera and species.

Alternative, if not cheaper, methods of identification include incubation in a radiometric automated Becton Dickinson culture system. Typically in such instances identification of M fortui-
tum is predicated on its ability to grow in p-nitrobenzoic acid and MacConkey’s agar. Its inability to form any pigment on Löwenstein-Jensen medium; tolerance to 5% NaCl; positive nitrate reduction; and positive arylsulfatase test are also crucial defining characteristics. However, these are not always accurate.

M fortuitum, as with most rapidly growing NTM, is resistant to standard antituberculous drugs. However, these organisms are known to be sensitive to cephalosporins, amikacin, ciprofloxacin, clarithromycin and imipenem. With regard to the optimum management of M fortuitum infections, the American Thoracic Society recommends surgical intervention and antimicrobial therapy for a minimum period of 4 months to achieve a high likelihood of cure; antibiotic therapy alone is often associated with recurrences, chronic drainage and sinus tract formation. Adequate debridement and wide excision of infected tissue and plentiful irrigation are recommended to avoid recurrence.

Figure 2 Necrotising granulomatous inflammation with an epitheliod histiocytic granulomatous reaction.
Contributors TK collected all the patient data and wrote the manuscript. AH was involved in revising and amending the manuscript for important intellectual content. SN offered advice from a Microbiology point of view and gave approval for publication. TO revised the manuscript with recommendations and approved the manuscript for publication.

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REFERENCES


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