A Case of Subcutaneous Infection with *Mycobacterium mageritense* Identified by Matrix-assisted Laser Desorption/Ionization-time of Flight Mass Spectrometry

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Mycobacterium mageritense is a recently identified rapidly growing uncommon mycobacteria (RGM) (1). Only 9 cases of skin and soft-tissue infection with *M. mageritense* have been reported to date (1–7) (**Table I**). Although accurate identification of the pathogenic bacteria is mandatory for efficient treatment, using conventional methods for the identification of *M. mageritense* is complex and time-consuming. We report here a case of subcutaneous infection with *M. mageritense* that was treated successfully with antibiotics, in which matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF MS) (8) enabled rapid identification of the species.

Table I. Summary of 9 cases of skin and soft tissue infection with *M. mageritense* reported

Sex/age, years	Surgical inter-vention	Antibiotics	Duration of treatment	Outcomes	Ref.
F/37	Yes	DOXY, CFPM	9 months	Cured	1
M/25	Yes	AMK, IPM/CS	N/A	Improved	1
F/43	Yes	TMP-SMX, LVFX	3 months	Cured	2
F/56	No	GFLX	2 months	Cured	2
M/48	Yes	N/A	12 months	Cured	3
F/59	Yes	CPFX, CAM	12 months	Cured	4
M/66	Yes	MLFX, CAM	4 days	Cured	5
M/52	Yes	CAM, LVFX	6 months	Cured	6
F/85	Yes	LVFX, IPM/CS, MINO	4 months	Cured	7
M/70	No	CAM, LVFX, MINO	7 months	Cured	This case

DOXY: doxycycline; CFPM: cefepime; AMK: amikacin; IPM/CS: imipenem/cilastatin; TMP-SMX: trimethoprim/sulfamethoxazole; LVFX: levofloxacin; GFLX: gatifloxacin; CPFX: ciprofloxacin; MLFX: moxifloxacin; CAM: clarithromycin; IPM/CS: imipenem/cilastatin; MINO: minocycline; N/A: not available; F: female; M: male.

CASE REPORT

A 70-year-old Japanese man developed subcutaneous abscesses in the periumbilical region within 2 weeks after a laparoscopic cholecystectomy. After unsuccessful treatments with antibiotics (cefamezin and vancomycin) and immunosuppressive agents (prednisolone and azathioprine) for 1 year, he was referred to our hospital. On examination, a total of 80 reddish nodules intermittently excreting pus were observed on the abdomen (**Fig. 1**a). Histopathologically, the dermis and subcutaneous adipose tissue were prominently infiltrated with neutrophils (Fig. 1b, c). An

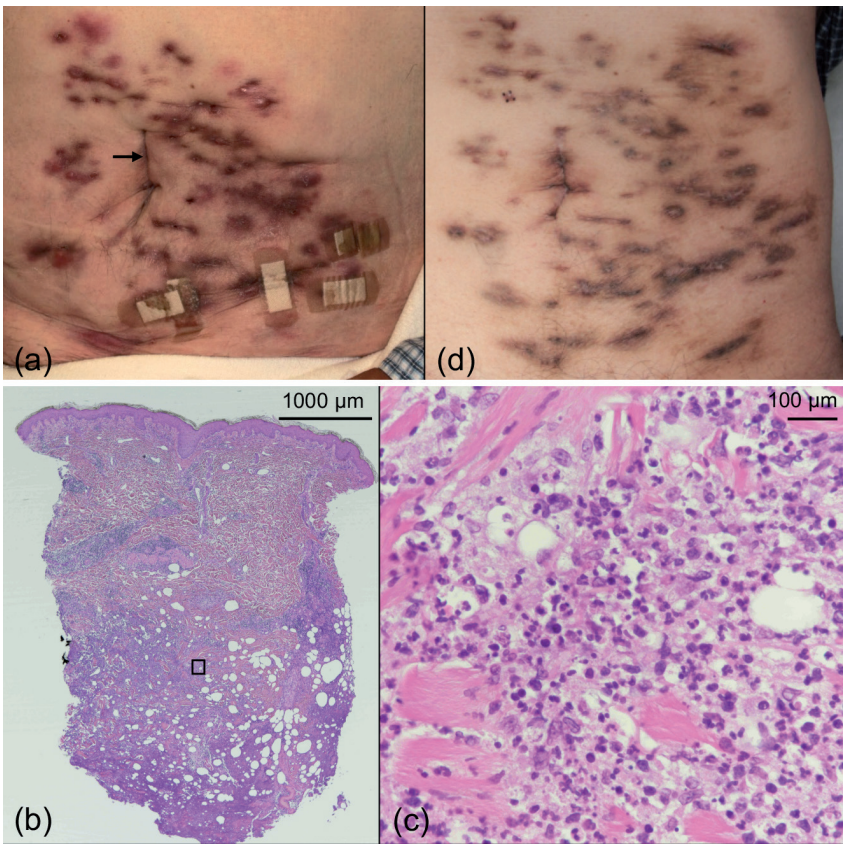

Fig. 1. Clinical pictures and histopathology. (a) A clinical picture before the treatment, showing reddish nodules on the abdomen. *Arrow*: scar from the laparoscopic cholecystectomy contiguous to the umbilicus. Histopathology: (b) low-magnification view showing a prominent infiltration of neutrophils in the deep dermis and subcutaneous adipose tissue. (c) High-magnification view of the rectangle in (b). (d) A clinical picture after treatment with antibiotics, showing post-inflammatory pigmentation.

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acid-fast bacillus culture grown from the excreted pus at 37°C for 3 days revealed a *Mycobacterium* species. It was identified as *M. mageritense* using MALDI TOF-MS system (Microflex LT and MALDI Biotyper, Bruker Daltonics GmbH) with a score value of 2.26 according to the MycoEx extraction protocol (v.3.0) and Mycobacteria Library 4.0. In addition, full-length sequencing of the 16S rRNA gene confirmed this finding. Based on these results, the patient was given a diagnosis of subcutaneous infection with *M. mageritense*.

In advance of the species identification and drug-susceptibility tests, we empirically administered clarithromycin (800 mg/day), levofloxacin (500 mg/day) and minocycline (200 mg/day). After initiation of these antibiotics, no new lesions emerged and the pre-existing eruptions began to subside. Following the species identification, clarithromycin was stopped because *M. mageritense* is known for its resistance to macrolides (1). Consistently, drug-susceptibility tests later revealed that the isolate was sensitive to levofloxacin and minocycline and resistant to clarithromycin. Within 9 months after the initiation of the antibiotics, all of the subcutaneous indurations had diminished, leaving post-inflammatory pigmentation (Fig. 1d). After antibiotics were stopped, no recurrence was observed in 9 months of follow-up.

DISCUSSION

The standard treatment for non-tuberculous mycobacterial infections is a combination of antibiotics (9). The selection of antibiotics is usually based on drug susceptibility tests, yet the correlation between *in vitro* drug susceptibilities and *in vivo* treatment outcomes can be ambiguous for RGM infections (10). *M. mageritense* is known for its resistance to macrolides, which are often used for RGM infections; thus, an accurate identification of the bacterial species is mandatory for effective treatment of infections (1).

In general, the species within *Mycobacteria* are identified using PCR-based and/or DNA-DNA hybridization-based methods in a clinical laboratory (11). However, *M. mageritense* is not identifiable using commercially available kits; and the more robust identification methods (PCR restriction enzyme analysis, 16S rRNA gene sequencing, and high-performance liquid chromatography) are complicated and time-consuming, delaying the selection and administration of appropriate antibiotics. Recently, MALDI-TOF MS has been widely used for species identification, in which a colony is picked from a culture plate and is directly submitted to the analysis chamber after drying (8). Since the analysis processes of MALDI-TOF MS itself takes only a few seconds, MALDI-TOF MS enabled us to identify *M. mageritense* in a day from the initiation of the examination, providing a theoretical basis for the selection and long-term administration of antibiotics. This patient's broadly distributed lesions were successfully treated using only antibiotics, although a surgical resection of remaining lesions is often required for the treatment of skin or subcutaneous tissue infections with *M. mageritense* (Table I). In addition, because of the paucity of evidence for the identification of the minor NTM, *M. mageritense*, by MALDI-TOF MS, we corroborated the result by the most robust method of full-length sequencing of the 16S rRNA. Further accumulation of data might certificate MALDI-TOF MS as a stand-alone method for the identification of *M. mageritense*.

This report describes the clinical course of a case of subcutaneous infection with *M. mageritense* showing a broad distribution of abscesses. MALDI-TOF MS enabled the efficient identification of *M. mageritense* and thus its effective treatment with a combination of antibiotics.

The authors have no conflicts of interest to declare.

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