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Multiple Recalcitrant Draining Sinuses Caused by *Mycobacterium mageritense* Following Laparoscopic Cholecystectomy: a Case Report and Brief Review of Literature

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Mycobacterium mageritense are rapid-growing mycobacteria (RGM), which were first isolated in Spain in 1987 and were described as a new species by Domenech in 1997 (1). It has been seldom reported to cause serious human infections (2). Here, we report a highly recalcitrant case of *M. mageritense* subcutaneous infection after laparoscopic cholecystectomy, in which matrix-assisted laser desorption ionization-time-of-flight mass-spectrometry (MALDI-TOF MS) enabled rapid species identification. To the best of our knowledge, this is only the second case of *M. mageritense* infection reported in India and worldwide following laparoscopic intervention.

A 38-year-old non-diabetic male, presented to the surgical outpatient department in May 2017 with multiple, intermittently draining sinuses on the anterior abdominal wall for the last three years. He had undergone laparoscopic cholecystectomy in December 2014 at a private hospital. Ten days post-operation, he developed low-grade fever and a draining sinus in the epigastrium. Tissue excision from this sinus was followed by development of multiple draining sinuses. He was administered multiple cocktails of antibiotics such as clarithromycin and amikacin. At another institute, the patient underwent exploratory laparotomy in November 2015, and histopathological examination of the excised tissue revealed granulomatous inflammation. Aerobic bacterial culture of the pus was sterile and stains for acid-fast bacilli and nocardia were negative. His blood was found to be negative for hepatitis B, C, and HIV infection. In view of the histopathology report and nonresponse to antibiotics, empirical anti-tubercular therapy (ATT) (category 1; isoniazid, rifampicin, pyrazinamide, and ethambutol for two months, followed by the first three drugs for four months) was initiated as tuberculosis is endemic

in India. However, no improvement occurred even after three months. Next, the patient consulted several healthcare practitioners and took several courses of antibiotics with no significant improvement.

Upon examination, multiple sinuses were observed on the anterior abdominal wall (Fig. 1A), with pain, tenderness, and discharge of purulent material. Zeihl Neelsen stain of pus revealed few acid-fast bacilli. GeneXpert analysis of this sample was negative. Aerobic bacterial culture on sheep blood and MacConkey agar and fungal culture on Sabaraud's dextrose agar were sterile. Pus culture on Lowenstein Jensen (LJ) medium grew smooth, buff-colored colonies on third day of incubation, which contained acid-fast bacilli. At 42°C, the culture had a rough, dry, buff colored colony. The isolate grew on MacConkey agar in four days but did not produce any pigment. It reduced nitrate and grew on LJ media containing 5% sodium chloride. The strain was confirmed by MALDI-TOF (Bruker Daltonik, Hamburg, Germany) as *M. mageritense* (score 2.097). A repeat culture of pus yielded the same organism. Susceptibility testing of the isolate by broth microdilution as per Clinical Laboratory Standards Institute (CLSI) guidelines showed sensitivity to levofloxacin, moxifloxacin, cefoxitin, amikacin, doxycycline, tigecycline, linezolid, imipenem, and minocycline and resistance to clarithromycin, ceftriaxone, and cefepime (3).

Magnetic resonance imaging revealed multiple small anterior abdominal wall collections. The patient's sinus tracts were removed and combination therapy was started with amikacin, levofloxacin, linezolid, and cotrimoxazole for three months, and extended for another three months. After six months, he did not return for a follow-up. Although we could track him after a year, the patient was still in a similar condition, where the sinuses formed and the pus drained and healed itself; nonetheless, the severity had decreased (Fig. 1B). The patient did not wish to receive allopathic treatment and inclined toward herbal medicines, and he could not be followed up since then.

RGM are environmental organisms, most species of which have been isolated from soil and water with *M. fortuitum-chelonae* and *M. abscessus* being

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Fig. 1. (Color online) (A) Multiple draining sinuses and inflamed nodules on anterior abdominal wall of patient at presentation. (B) Partly healed sinuses with post-inflammatory pigmentation and scarring.

Table 1. Previous reports of skin and soft tissue infection due to *Mycobacterium mageritense*

S. no.	yr	Age/ Sex	Location	Site affected	Risk factors/past history	Surgical intervention	Antibiotics, duration	Duration of antibiotics	Reference
1.	2002, Wallace	37/F	USA	Surgical wound infection	Liposuction	Yes	Ciprofloxacin, doxycycline	6 mon	(7)
2.	2002, Wallace	25/M	USA	Wound infection	Fracture femur, open reduction	Yes	Amikacin, imipenem	-	(7)
3.	2004, Gira	43/F	USA	Furunculosis	Footbaths (pedicure at nail salon)	No	Trimethoprim-sulfamethoxazole, levofloxacin	3 mon	(5)
4.	2004, Gira	56/F	USA	Furunculosis	Footbaths (pedicure at nail salon)	No	Gatifloxacin	2 mon	(5)
5.	2008, Appelgren	48/M	Sweden	Wound infection	Trauma (tsunami survivor)	Yes	-	12 mon	(6)
6.	2013, Yonetani	66/M	Japan	Surgical wound infection	Gastrectomy	Yes	Moxifloxacin, clarithromycin	4 days	(6)
7.	2015, Maruyama	52/F	Japan	Cutaneous	-	Yes	Clarithromycin, levofloxacin	6 mon	(6)
8.	2016, Ogawa	85/F	Japan	Surgical wound infection	Mesh insertion	No	Levofloxacin, imipenem, minocycline, levofloxacin	6 wk 3 mon	(6)
9.	2018, Oiwa	70/M	Japan	Subcutaneous abscesses	Laparoscopic cholecystectomy (surgical site infection)	No	Clarithromycin, levofloxacin, minocycline	7 mon	(6)
10.	2019, Shah	27/F	India	Surgical wound infection	Lower segment caesarean section	No	Cephalexin, cefixime, amoxicillin-clavulanic acid	7 mon	(10)

frequently linked to human disease (4,5). Clinical disease produced by *M. mageritense* is uncommon (Table 1). As *M. mageritense* is known for its resistance to macrolides, which are often used for treating RGM infections, accurate identification of bacterial species

becomes necessary for effective treatment (6). However, the use of biochemical tests alone may lead to the misidentification of *M. mageritense* as *M. fortuitum* (5). MALDI-TOF MS provides a rapid, reliable, and cost-effective method for species identification (6).

It prevents delays in selection and administration of appropriate antibiotics. In the present case, repeated sampling of lesions was performed at various laboratories with negative results, which indicates the variable capacity of laboratories to identify uncommon RGM (5).

Six of the ten reported cases of skin and soft tissue infections due to *M. mageritense*, occurred following surgery (Table 1). Oiwa et al. documented the first case of *M. mageritense* subcutaneous abscesses following laparoscopic cholecystectomy (6). Inadequate cleaning and disinfection of instruments and ports can transmit infections. The general practice in India is to immerse instruments in 2–2.5% glutaraldehyde for 20 min, achieving disinfection but not sterilization (4), and this appears to be a plausible source of infection in our patient. Use of disposable laparoscopic instruments is the gold standard for prevention of infection. For reusable equipment, ultrasonic technology for mechanical cleaning of endoscopes after complete dismantling of parts, followed by ethylene oxide or gas plasma sterilization, is recommended. It is advisable to use liquid chemical sterilants at a high concentration (3.4%) for 8–12 h to activate sporicidal activity. Furthermore, the instruments should be rinsed with autoclaved water to prevent recontamination post-sterilization (4).

Treatment of RGM infections usually requires long duration of combination antibiotic therapy. The susceptibility pattern of *M. mageritense* is similar to the *M. fortuitum* third biovariant complex, with high-level resistance to clarithromycin. Drugs with therapeutic potential include cefoxitin, sulfonamides, imipenem, linezolid, and newer quinolones (7). The patient in this case study was mistreated by different practitioners without an established diagnosis. In addition, excision of tissue from a draining sinus may have caused the spread of infection and development of multiple draining sinuses. The reporting center promptly identified the infection as RGM; however, its persistent nature posed a challenge. A recent study has shown that most human infections with RGM are biofilm-related (8). *M. mageritense* is capable of producing biofilms (9). Decreased antibiotic permeability, metabolic latency, and dissemination of bacteria contribute to the development of biofilm-associated chronic infections (8). The chronic and refractory lesions in the present case point to the possibility of biofilm formation by

M. mageritense.

Clinical suspicion, early diagnosis, and timely institution of specific antibiotic therapy could have resulted in complete resolution of infection. *M. mageritense* should be included in the differential diagnosis of surgical site infection not responding to conventional antibiotics. Species-level identification must be performed prior to initiation of treatment, as *M. mageritense* is resistant to clarithromycin unlike other RGM.

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Conflict of interest None to declare.

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