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Case Report

Complicated skin and soft tissue infection with *Mycobacterium fortuitum* following excision of a sebaceous cyst in Taiwan

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Abstract

Mycobacterium fortuitum group (*M. fortuitum*), also known as rapidly growing *Mycobacteria*, can cause pyogenic infections in human beings, most commonly in immunocompromised patients. Herein, we present a 40-year-old immunocompetent male patient who underwent planned excision of a sebaceous cyst in the abdominal wall. He suffered from tender erythematous lesions with purulent discharge around the healing wound that developed 2 weeks after surgery. Gram stain, bacterial and fungal culture results of the wound were negative. A diagnosis of non-tuberculous mycobacteria was made from a wound culture from the area of operative debridement, which was subsequently confirmed to be *M. fortuitum* group using PCR-restriction fragment length polymorphism analysis of the hsp65 gene. The patient received 4 weeks of parenteral imipenem/cilastatin 500 mg every 6 hours and amikacin 500 mg every 12 hours, plus oral clarithromycin 500 mg twice daily, and the wound recovered completely. He was discharged and followed up regularly at our outpatient clinic, and continued taking oral ciprofloxacin and clarithromycin 500 mg twice daily for 6 months. This case highlights the importance of strict aseptic precautions even during minor procedures, and also the characteristics of *M. fortuitum* infections in immunocompetent patients, which usually develop as localized postsurgical wound infections. We also share our experience in successfully treating a *M. fortuitum* complicated skin and soft tissue infection.

Key words: *Mycobacterium fortuitum;* non-tuberculous mycobacteria; complicated skin and soft tissue infection; surgical site infection; antimicrobial treatment.

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Introduction

Non-tuberculous mycobacteria (NTM) are grouped into four broad categories according to the Runyon system. Groups I to III are slow-growing NTM, and group IV are fast-growing NTM, known as rapidly growing mycobacteria (RGM). NTM can cause pulmonary disease, skin and soft tissue infections (SSTIs), lymphadenitis, and disseminated disease in humans [1]. There are currently 70 recognized species of RGM that are classified in six groups based on genetic relation, pigmentation, and biochemical properties (e.g., the *Mycobacterium fortuitum (M. fortuitum)* group, *M. chelonae*, and *M. abscessus*). These RGM are widely distributed in the environment and have been reported to contaminate water supply system, cleaning agents and solutions in hospitals [2]. RGM can produce a positive culture within 7 days as opposed to slow-growing mycobacteria, and have emerged as important human pathogens which can cause a variety of diseases ranging from localized cutaneous infections to disseminated infections [1]. If contaminated water is used to clean catheters, surgical

instruments, and scopes, then postsurgical wound infections may occur. Skin and soft tissue infections due to NTM after surgical procedures have been widely reported, however there are currently no standard guidelines for the treatment of *M. fortuitum* group SSTIs [3]. Herein, we present the case of an immunocompetent patient who developed a postoperative complicated SSTI due to *M. fortuitum* infection.

Case Study

A 40-year-old Taiwanese male patient who was in good health was referred to the Department of Plastic Surgery of Chung Shang Medical University Hospital, Taichung, Taiwan. He had tenderness, warmth, and erythematous lesions with purulent discharge around a healing wound that developed 2 weeks after excision of a sebaceous cyst in the abdominal wall that was performed at a local hospital. He was treated with parenteral cefazolin 1 g every 6 hours and gentamycin 80 mg every 12 hours for 1 week. However, this did not improve his condition and he was subsequently admitted to our hospital. On admission, his vital signs were stable, and purulent discharge and cellulitis were found on the wound. An initial diagnosis of cellulitis and an abscess was made, and he received debridement and suturing of the wound. He was discharged after a course of parenteral oxacillin 2 g every 6 hours for 1 week, and he was followed up at our outpatient clinic. Three months later, multiple small wounds were noted near the suture line on the abdominal wall, all of which had small discharge. One month before admission, the wound had become tender with erythematous lesions. We arranged abdominal computed tomography (CT) with contrast medium, which revealed an abscess on the left abdominal wall (Figure 1). He had no systemic symptoms, and he was admitted for regional fasciectomy and debridement. Bacterial and fungal cultures taken during surgery revealed no significant growth, and an acid fast (AFB) stain of the surgical wound was negative. The results of histopathology in Hematoxylin and Eosin stain (Figures 2a and 2b) as well as AFB stain (Figures 2c and 2d) suspected tuberculosis or NTM infection. Another histopathology revealed typical mycobacterial infection (Figure 3). The culture from the last sample taken during surgery grew

Figure 1. Abdominal computed tomography (CT) with contrast medium revealed enhanced lesions and fluid collection in the cutaneous and subcutaneous tissues on the left abdominal wall.

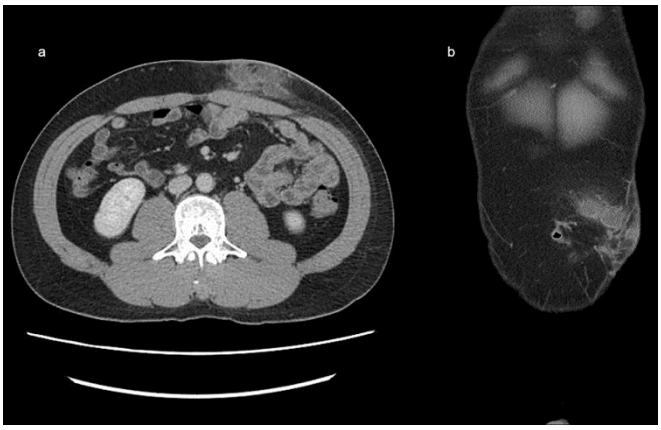


Figure 2. Histopathology revealed a caseation necrosis (c) with granulation tissue formation surrounding by lymphocytes (l) and epithelioid histiocytes (h). (2a 100× magnification and 2b 200× magnification in Hematoxylin and Eosin stain) The acid-fast stain (2c and 2d 400× magnification) showed a few mycobacterium microorganisms (t). Tuberculosis or non-tuberculous mycobacteria were suspected.

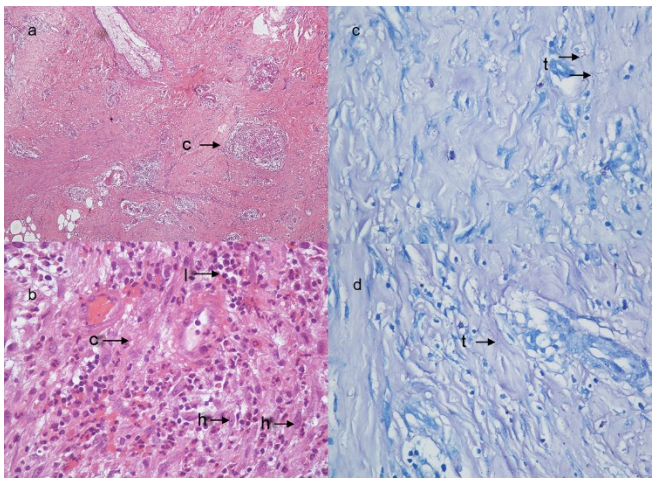
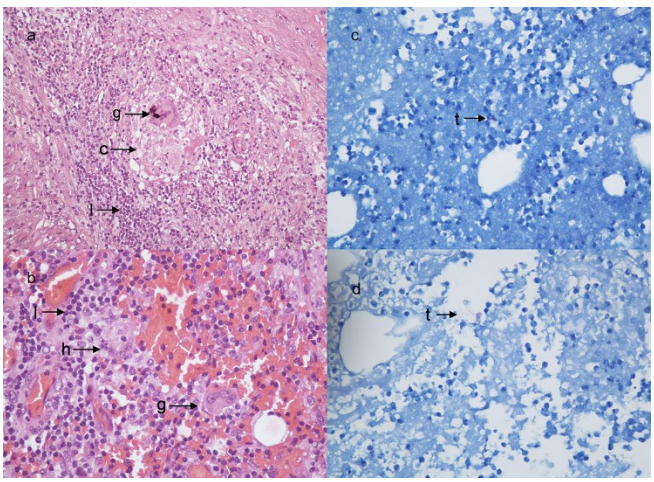


Figure 3. Histopathology revealed a caseation necrosis (c) surrounding by multinucleated giant cells (g), lymphocytes (l), and epithelioid histiocytes (h). Periodic acid-Schiff and acid-fast staining showed rare positive microorganisms (t). (3a 200× and 3b 400×magnification in Hematoxylin and Eosin stain, 3c and 3d 400× magnification).



NTM, and was subsequently confirmed to be *M. fortuitum* group using PCR-restriction fragment length polymorphism analysis of the hsp65 gene [4]. He received parenteral imipenem/cilastatin 500 mg every 6 hours and amikacin 500 mg every 12 hours plus oral clarithromycin 500 mg twice daily for a *M. fortuitum* SSTI. After 41 days of treatment with a combination of wound debridement and combined antimicrobial therapy, he was relatively stable and was discharged. He continued taking both oral clarithromycin and ciprofloxacin 500 mg twice daily for 6 months. He returned to our outpatient clinic every 3 to 6 months, and was well without signs of infection 2 years later.

Discussion

NTM infections are known to cause systemic infections in patients suffering from acquired immune deficiency syndrome and in other immunocompromised individuals. In contrast, NTM infections in immunocompetent hosts are often localized, such as SSTIs. Healthcare-associated or post-surgical wound infections caused by RGM have often been reported as SSTIs [1,5-8]. The clinical presentation includes cellulitis, abscess formation, draining sinuses, and postoperative wound infection.

The *M. fortuitum* group are RGM that can cause pyogenic infections and are more common in immunocompromised patients, such as those receiving chemotherapy, long-term steroid therapy and after surgical procedures [9-11]. Pulmonary and disseminated diseases caused by *M. fortuitum* group are rare [12]. Cutaneous involvement usually occurs in immunocompetent patients with a clinical picture similar to our patient. Patients often do not have the characteristics of a systemic infection, which makes clinical diagnosis difficult. If an abscess and chronic inflammation occur after a surgical procedure involving the skin and subcutaneous tissues, empirical conventional antimicrobial treatment is recommended. If there is no response to this treatment, and results of Gram stains and routine bacterial cultures are negative, mycobacterial infection should be strongly suspected. A mycobacteria rapid screening test, such as AFB staining, along with cultures for tuberculosis and NTM organisms should be performed.

It is known that effective treatment of a RGM infection includes surgical treatment combined with antimicrobial therapy [13]. However, the type and duration of antimicrobial treatment for NTM-related infections is poorly understood due to a lack of clinical trials [3,13, 14]. Patients with *M. fortuitum* group SSTIs should be treated for at least 4 to 6 months with two active agents [3,15]. It has also been suggested that the treatment regimen for non-pulmonary disease caused by RGM (*M. abscessus, M. chelonae, M. fortuitum*) should be based on in vitro susceptibility testing before administering it to the patient. According to the results of a study by Brown-Elliott and Wallace [3,13], the *M. fortuitum* group is far less drug resistant than other RGM. Thus, treatment of infections caused by the *M. fortuitum* group has been much easier and generally more effective than the treatment of other RGM infections. The therapeutic drugs usually recommended for infections involving the *M. fortuitum* group include amikacin, cefoxitin, imipenem/cilastatin, and fluoroquinolones [13]. In a study of isolates from a large nail salon outbreak of SSTIs, 29 isolates were susceptible to amikacin (100%), ciprofloxacin (100%), minocycline (100%), cefoxitin (91%), doxycycline (89%), gentamicin (82%), and trimethoprim-sulfamethoxazole (TMP-SMX) (61%), with intermediate susceptibility to clarithromycin (86%) [5,16]. However, a study from Taiwan reported a high prevalence of antimicrobial resistance in RGM including the *M. fortuitum* group (69 isolates), and amikacin was found to be the most active agent (100% susceptibility). Most isolates were susceptible to ciprofloxacin (62%), levofloxacin (64%), imipenem (64%), meropenem (64%), clarithromycin (65%), TMP-SMX (49%), and linezolid (68%) [17]. In a SSTI study in Taiwan, treatment with clarithromycin was used in 48% of cases and imipenem/cilastatin and amikacin were given to 22% of cases, and the cure rates were 74.2%, 92.3% and 81.8% for *M. abscessus, M. chelonae and M. fortuitum*, respectively, with a total treatment duration of 202.4 ± 207.3 days [6]. We successfully treated our patient with amikacin, imipenem/cilastatin, clarithromycin, and ciprofloxacin over the course of 203 days. Finally, we reviewed the reports of adult patients with treatment and outcomes of SSTIs due to *M. fortuitum* infection since the year 2000 to 2015 using PubMed (http://www.ncbi.nlm.nih.gov/pubmed) in the English-language literature (Table 1).

In conclusion, postoperative wound infections caused by *M. fortuitum* are not uncommon, and their incidence is increasing. We treated our patient with a combination of surgery and a prolonged course of antimicrobial therapy, based on susceptibility testing for *M. fortuitum* SSTI. We recommend vigilance regarding NTM infections in daily surgical practice if a postsurgical wound infection does not respond to conventional antimicrobial therapy.

Table 1. Reports of adult patients with treatment and outcomes of skin and soft tissue infections due to *Mycobacterium fortuitum* infection from the year 2000 to 2015.

Age/sex	Study type	Risk factors	Clinical manifestations and findings	Antibiotics treatment/duration of treatment (months)	Number of Surgical interventions	Clinical Outcome	References
52/F	Case report	Neck liposuction	Subcutaneous erythematous nodule, tenderness, purulent fluid aspiration	Ciprofloxacin clarithromycin 1 months Minocycline 2 weeks	None	Resolved	[18]
31/F	Case report	Prosthetic breast implants, DM	Flu-like symptoms, nausea, vomiting, and swelling of right breast. Tenderness, odorless, tan-brown fluid aspiration	Ciprofloxacin TMP-SMX 6 months	Two	Resolved	[19]
26/F	Case report	Prosthetic breast implants	Swelling of right breast, erythematous, tenderness, serosanguineous fluid, systemic illness	Clarithromycin TMP-SMX 6 months	Yes	Resolved	[19]
27/F	Case report	Bilateral prosthetic breast implants	Pain swelling of right breast, Swelling of right breast,	Amikacin (6 weeks) Ciprofloxacin 6 months	Two	Resolved	[20]
23/M	Case series	None	2-month ulcer on the right shin, pain, purulent discharge	Ciprofloxacin clarithromycin 3 months	None	Resolved	[21]
63/F	Case series	Lung cancer Thoracotomy	Pus from inflammation, wound	Cephalexin	Yes	Resolved	[1]
38/F	Case series	Breast cancer	Inflamed incision site, wound abscess	Azithromycin, moxifloxacin	Yes	Resolved	[1]
55/M	Case report	Primary Achilles tendon debridement with flexor hallucis longus augmentation	Wound dehiscence, serous drainage, wound maceration	Imipenem/cisplatin and amikacin (4 weeks) Ciprofloxacin clarithromycin 6 months	Three	Resolved	[11]
47/F	Case report	Abdominal liposuction, DM	Multiple abdominal wall abscesses	Linezolid, ciprofloxacin 4 months	Three	Resolved	[10]
23/F	Case report	Acupuncture	Red-violaceus ulcerated skin lesions and subcutaneous nodules at the acupuncture site.	Ciprofloxacin, doxycycline 6 months.	None	Resolved	[22]
51/F	Case report	None	Spontaneous breast abscess, swelling and tenderness	Ciprofloxacin doxycycline 2 months	Yes	Resolved	[23]
19/F	Case report	Dermal piercing	Erythema and edema	Ciprofloxacin clarithromycin 2 months	None	Resolved	[24]
37/M	Case report	Injected anabolic steroids	Multiple recurrent non-healing skin abscesses	Ciprofloxacin doxycycline moxifloxacin	Yes	Resolved	[25]
61/F	Case report	Subcutaneous injections with Vietnamese traditional medicine, hypertension	Erythematous, painful, swollen, and abscesses systemic illness	Amikacin, clarithromycin, doxycycline, TMP-SMX, imipenem/cisplatin (4 months) and amoxicillin-clavulanic acid 4 months	Yes	Resolved	[26]
29/M	Case report	Tattoo	Non-pruritic, scattered crusted erythematous papules	Clarithromycin, ciprofloxacin, TMP-SMX, 2 months	None	Resolved	[27]
21/F	Case report	Nipple piercing	Breast abscess	TMP-SMX, azithromycin 6 months	Two	Resolved	[28]
61/M	Case report	Renal transplant recipient, diabetic nephropathy	Non-tender, nodular skin lesions around the renal allograft scar, with a few surrounding vesicles, anterior abdominal wall muscles abscess	Cefoxitin (two weeks) and clarithromycin, ciprofloxacin, and TMP-SMX 6 months	None	Resolved	[29]

M: male, F: female, DM: diabetes mellitus; Trimethoprim-sulfamethoxazole: TMP-SMX.

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