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Analysis of a Case of Soft Tissue Infection Caused by Mycobacterium Fortuitum

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Abstract: *Background*: Mycobacterium fortuitum complex (MTC) is a group of rapidly growing nontuberculous mycobacteria (NTM) that often develop in immunocompromised patients, while local NTM disease is most common in postoperative wound infections or invasion of the skin from wounds. Clinical case reports are rare, which often lead to tissue abscess and ulceration, and natural resistance to anti-tuberculosis drugs, difficult to control, long treatment process, mostly lasting more than half a year or even a year, and the therapeutic effect is relatively poor. The incidence of NTM-associated infections is increasing and is emerging as a global public health concern. *Objective*: To introduce the diagnosis and treatment of a case of soft tissue infection caused by Mycobacterium fortuitum in order to improve clinicians' understanding of the disease and deepen the understanding of bacteriological characteristics of the bacterium by microbiological examination personnel. *Methods*: Bacterial culture was performed in wound secretion, and MRI was performed to examine soft tissue infection. *Result*: Mass spectrometry analysis of bacterial culture of wound secretion showed Mycobacterium fortuitum infection. MR showed soft tissue infection and sinus formation in the posterolateral aspect of the right ankle. After diagnosis, the antibiotic regimen was adjusted to levofloxacin, amikacin, and rifampicin for triple anti-infection. One month later, the patient was discharged from the hospital for oral treatment with levofloxacin tablets, clarithromycin tablets and rifampicin capsules for 1 year and followed up for 1.5 years without recurrence. *Conclusion*: This paper can provide reference for etiological diagnosis, identification and treatment of non-tuberculous mycobacteria-related soft tissue infection.

Keywords: Non-Tuberculous Mycobacteria, Mycobacterium Fortuitum, Orthopaedic, Rapidly Growing Mycobacteria

1. Introduction

Non-tuberculous mycobacteria (NTM) refers to a general term for a large group of mycobacteria in addition to Mycobacterium tuberculosis complex (including tuberculosis, bovine, African, vole, goat, pinnipedii, suricattae, and mungi mycobacteria) and Mycobacterium leprae, formerly known as atypical mycobacteria, atypical acid-fast bacilli, unclassified mycobacteria, unclassified mycobacteria, innominate mycobacteria, Mycobacterium wild, opportunistic mycobacteria, Mycobacterium paratuberculosis, and pseudotuberculosis. To date, more than 190 NTM species and 14 subspecies have been identified (http://www.bacterio.net/mycobacterium.html), most of which are parasitic bacteria, and only a small proportion are pathogenic to humans and are opportunistic pathogens. [1-4]. It is widely distributed in natural environments such as soil, water, and dust, and opportunistic pathogens as environmental sources, and diseases associated with NTM have been clinically observed to show a significant increase, [5, 6], The most common is lung infection, with approximately 10% of infections presenting as extrapulmonary disease [7]. In view of the great similarity between the clinical manifestations and laboratory identification of nontuberculous mycobacteria and Mycobacterium tuberculosis, it is very easy to be misdiagnosed or missed as tuberculosis treatment in clinical practice [8], and common conventional bacterial culture is not easy to detect, therefore, the culture and identification of nontuberculous

mycobacteria is of great significance for clinical practice.

Mycobacterium fortuitum is widely distributed in nature and belongs to rapidly growing mycobacteria, and clinical case reports are rare, which often lead to tissue abscess and ulceration, and natural resistance to anti-TB drugs [7], difficult to control, long treatment process, mostly lasting more than half a year or even a year, and the therapeutic effect is relatively poor [9]. A case of Mycobacterium fortuitum infection in orthopedic patients in our hospital was analyzed retrospectively, and the laboratory examination process, clinical characteristics and diagnosis and treatment plan were analyzed to provide a reference for clinical diagnosis and treatment.

2. Case Presentation

A 63-year-old male patient was admitted due to "non-union of right foot mass for more than 20 days after resection and drainage" on January 11, 2021. Three months ago, the patient felt itching in the right foot and ankle after being punctured by branches to the skin during greening work. At that time, there was no skin damage, rash or ecchymosis, no obvious tenderness. About 1 week after scratching, the patient developed swelling in the posterior side of the right foot and ankle, skin redness, significant tenderness and fluctuation. The patient visited a local hospital and was given symptomatic treatment such as cutting and drainage of pus. Twenty days ago, the patient developed recurrent skin swelling on the posterior side of the right foot and ankle, with significant tenderness and fluctuating sensation, and then visited the Department of General Surgery of our hospital for symptomatic treatment such as incision and drainage of the abscess. Today, the patient came to our hospital due to poor healing of the skin incision in the posterior part of the right foot and ankle and purulent discharge at the incision site. The patient was previously healthy and had no history of hypertension, diabetes, or bronchial asthma. No history of food or drug allergy.

Physical examination, A skin defect of about 1.5*3cm was observed on the posterior skin of the right ankle joint (as shown in Figure 1), with dark red bloody exudate at the defect site and pale skin around the incision, without obvious odor; a skin sinus tract of about 0.5*0.5cm^2 was observed on the lateral side, with purulent exudate at the sinus orifice; a purulent nodule was observed about 2cm medial to the sinus orifice, with skin depression about 3*3cm^2 around the purulent nodule, and the skin at the depression site was dark red and tender. The right dorsalis pedis pulse was normal, and the muscle strength and sensory function of the right lower limb were normal.

Auxiliary examination, Blood routine on admission: WBC: 2.78 * 10^9/L, RBC: 2.79 * 10^{12}/L, hemoglobin: 110.0g/l. Enzyme immunoassay report: procalcitonin 0.06 ng/ml, biochemistry: chlorine 107.0mmol/l, iron 43.6umol/l, urea/creatinine 0.09, urine routine, stool routine, chest X-ray, ECG, cardiac ultrasound showed no significant abnormality.

On admission, the wound of right foot and ankle infection was expanded, and secretion culture was taken. The results of bacterial culture and mass spectrometry analysis of secretion at the skin lesions suggested Mycobacterium fortuitum infection. After diagnosis, according to drug sensitivity test, levofloxacin, amikacin and rifampicin were used for triple anti-infective therapy. The second operation showed granulation tissue growth around the right foot and ankle incision and sinus formation at the lateral malleolus of the right foot. So we performed a third operation on them and continued to give levofloxacin, amikacin, and rifampicin triple anti-infection after surgery, and pathological diagnosis of the tissues taken during surgery showed inflammatory granulation tissue and fibrous hyperplasia, surrounded by degenerated necrotic material, red blood cells, and a large amount of neutrophil exudation. One week after surgery, the right lateral sinus tract healed and the right posterior heel sneak lacuna disappeared. However, just one month later, the patient was readmitted with a recurrent skin ulceration of approximately 2*2 cm on the posterior aspect of the right ankle and purulent discharge at the ulcerated margin. Combined with the previous treatment experience, we performed debridement, and continued to give levofloxacin, amikacin, rifampicin triple anti-infection after surgery. 2 weeks later, the patient had basal flushing of the right posterior malleolus wound and granulation tissue hyperplasia, and was discharged uneventfully. Levofloxacin tablets, clarithromycin tablets and rifampicin capsules were administered after discharge. During follow-up 4 months later, the patient 's posterior right foot and ankle wound had healed with scarring without significant tenderness and no abnormal sensory activity. (As shown in Figure 4).

Figure 1. *Pre-operative wound condition.*

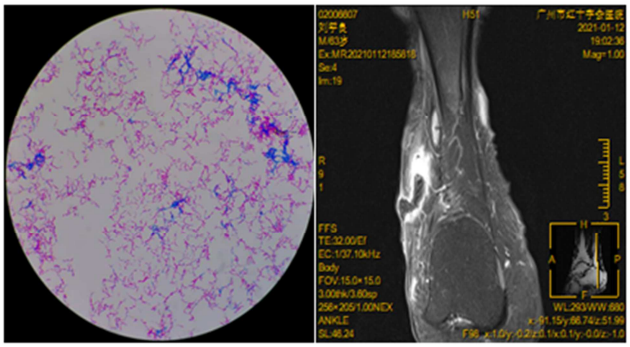

Figure 2. *The results of bacterial culture and mass spectrometry suggested Mycobacterium fortuitum infection, MR showed posterolateral soft tissue infection of the right ankle with sinus formation.*

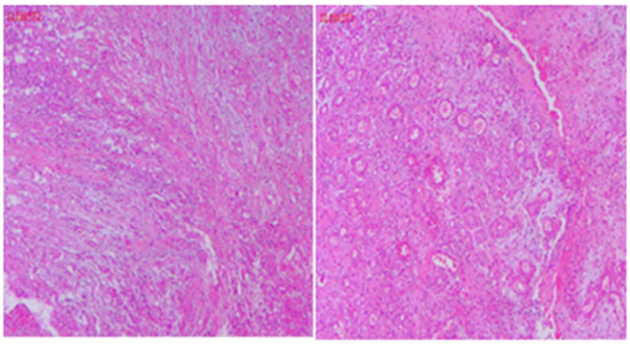

Figure 3. *Histopathologic diagnosis showed inflammatory granulation tissue proliferation, vascular proliferation, a large number of lymphocytes and plasma cell infiltration.*

Figure 4. *Follow-up after the first surgery, the second surgery and 4 months after discharge.*

3. Conclusion

Nontuberculous mycobacteria can cause diseases in various parts of the body, of which pulmonary infections account for about 90% are the most common, lymph nodes, skin and soft tissue, bone, and systemic disseminated lesions are also common, and cases of central nervous system, cornea, and ear infections have also been reported. [10] Mycobacterium fortuitum belongs to NTM group V, an opportunistic pathogen that often develops in immunocompromised patients, while local NTM disease is most common in postoperative wound infections or invasion of the skin from the injured site. Cases of NTM infection in the skin, hands, and lungs are currently analyzed, but cases of NTM infection in orthopedic patients are rare [11-14]. In this case, the patient presented with soft tissue infection of the foot and ankle caused by Mycobacterium fortuitum, and his clinical presentation, imaging features, and pathological biopsy supported the etiological diagnosis. Most importantly, Mycobacterium fortuitum was cultured from the wound secretion of this patient, and the antibiotic treatment regimen was adjusted promptly after determination, and satisfactory therapeutic results were finally obtained. As with most diseases, early diagnosis and early treatment are associated with overall treatment outcomes and prognostic survival. For M. fortuitum, finding the pathogen is the gold standard for the diagnosis of this disease. [15] The rich experience of microbial laboratory staff also lays the foundation for early etiological diagnosis. The initial colony observation, Gram staining and acid-fast staining all point out the direction for finding the etiology - the pathogen is very likely to be a type of NTM. The skilled use of all these detection methods has gained time for early anti-NTM treatment, and finally achieved satisfactory therapeutic effect. Therefore, when NTM infection is clinically suspected, a comprehensive analysis should be performed by etiological, histological, and molecular biological examinations in order to confirm the diagnosis in a timely manner. At present, there is no uniform program for the treatment of NTM-induced infection at home and abroad, but the results of NTM drug sensitivity studies provide help for the treatment of NTM. Because pathogen culture is difficult, sensitive antibiotics are often not selected for treatment based on susceptibility test results. According to a joint statement by the American Thoracic Society and the American Society of Infectious Diseases, the combination of 2 sensitive drugs is recommended until 1 to 2 months after the rash subsides [16]. The patient continued to receive levofloxacin, amikacin and rifampicin triple anti-infective therapy after 3 times of wound debridement and postoperative wound debridement, and continued to orally take levofloxacin tablets, clarithromycin tablets and rifampicin capsules for anti-infective therapy after discharge. Four months later, the patient was finally followed for scar healing. Therefore, anti-tuberculosis drugs, macrolides, and fluoroquinolones combined with chemotherapy can be empirically selected when NTM infection is clinically diagnosed without drug susceptibility testing to guide medication. Through this case analysis and summary, in patients with suspected nontuberculous mycobacterial infection, attention should be paid, and the culture, strain typing and identification of nontuberculous mycobacteria are important for diagnosis, differential diagnosis and differential diagnosis. For the treatment of non-tuberculous mycobacteria (Mycobacterium fortuitum), this type of bacteria is different from Mycobacterium tuberculosis, naturally resistant to anti-tuberculosis drugs, or has a high resistance rate. If the disease caused by non-tuberculous mycobacteria infection is treated according to tuberculosis, even if the patient uses the drug regularly for a long time, the standardized treatment effect is still poor, and then it becomes the so-called "refractory and retreated" tuberculosis patient [17, 18]. Because doctors lack the understanding of these pathogens, clinical pharmacists should actively communicate with doctors in clinical practice, actively participate in the treatment process of patients, provide relevant evidence-based medical evidence for the relevant treatment options, and recommend clinical optimization of treatment options, so as to promote the cure of patients' diseases and physical recovery.

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